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SECOND SERIES: PULMONATA.

MANUAL

OF

CONCHOLOGY;

STRUCTURAL AND SYSTEMATIC.

WITH ILLUSTRATIONS OF THE SPECIES.

BY GEORGE W. TRYON, JR.

CONTINUED BY

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CONSERVATOR OF THE CONCHOLOGICAL SECTION OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

Vol. VIII.

HELICIDÆ, Vol. VI.

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In the present volume the description and illustration of the Helicoid land mollusks will be completed. The first part (Part 29) will continue and complete the account of the genus *Cochlostyla*. The following part will contain additional species of *Helix*, being a supplement to volumes III, IV, V, VI and VII. The two parts remaining will contain a guide to the groups of Helices, a résumé of the anatomy of the group, and an Index to the species described in volumes II to VIII of the MANUAL.

For the constant sympathy, advice and criticism of correspondents, as well as for valuable information and specimens, the author is deeply grateful. Special thanks are due to Mr. Charles Hedley of Sydney, N. S. W.; to Mr. John Ponsonby of London, Mr. H. Suter, in New Zealand, Dr. J. C. Cox, Sydney, and to Dr. V. Sterki, New Philadelphia, Ohio.

H. A. P.

MANUAL OF CONCHOLOGY.

FAMILY *HELICIDÆ*, Vol. VI.

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Genus COCHLOSTYLA Fér. (Continued.)

Section ORTHOSTYLUS Beck.

This section formed the subject of the last pages of the preceding volume of the MANUAL, the larger species having been illustrated and described in that place. The forms to be discussed below lead from the more typical manifestations of *Orthostylus* toward the section named by v. Martens "Cochlostylæ elongatæ" or *Hypselostyla.*

C. NUX Semper. Vol. VII, pl. 36, fig. 34.

Imperforate, elongate-globose, the apex very obtuse; solid, obliquely distinctly striated and regularly malleated; unicolored rufous, covered with a brown cuticle. Whorls 5, convex, the last much inflated, as long as the spire. Columella somewhat straightened, white, excavated; aperture somewhat ear-shaped; peristome narrowly reflexed, pale violet colored within. (*Semp.*)

Alt. 44, diam. 39; alt. of aperture 24, width 18 mill.

Mountain district of Northeastern Luzon.

C. (*Orthostylus*) *nux* SEMPER, Reis. Archip. Phil., Landmoll. p. 204, t. 10, f. 2.

The exact locality is not known. The species is said by Semper to be quite near to *C. juglans*, but differs in contour and especially in the malleations upon the last whorl.

Group of C. mus.

Ovate or turbinate, dull colored species, covered with hydrophanous cuticle, which is nearly uniform or streaked in the direction of growth lines only.

C. MUS Broderip. Pl. 1, figs. 1, 2.

Imperforate, ovate-conoid, *solid.* Ground color reddish-brown, becoming light on the spire; covered with a white or cream-white hydrophanous cuticle which would be uniform except that it is usually much worn into oblique streaks, often having some spirals near the periphery. *Aperture as long as the spire.*

The spire is bluntly conoidal, apex obtuse; whorls 5½, the last a little descending in front. Aperture quite oblique, white or delicate lilac inside; peristome *thick,* reflexed, edged with dark brown; columella wide, white, arcuate above, *obliquely truncated below.*

Alt. 48, diam. 35 mill.; oblique alt. of aperture 29 mill.

Philippines.

Bulinus mus BROD. (in sched. Cuming) DELESSERT, Recueil, t. 39, f. 12.—REEVE, Conch. Icon. f. 10.—PFR., Conchyl. Cab. Bul. t. 52, f. 5, 6; Monogr. ii, p. 17.

It is a much less conoidal, narrower shell than *C. ticaonica,* wider than *C. leucophæa.* The oblique altitude of the aperture is about equal to or exceeds the length of the spire, whilst in *C. leucophæa* the spire is decidedly longer.

C. LEUCOPHÆA Sowerby. Pl. 1, figs. 7, 8.

Imperforate, ovate-conoidal, *solid.* Ground color dark brown, becoming yellowish on the spire, then whitish, the apex faint brown; *covered with a white or brownish hydrophanous cuticle which shows a blackish band at the periphery, and usually an irregular series of eroded spots above,* somewhat as in *C. fenestrata* and *C. curta.*

Spire elevated, obtuse; whorls 6, the last slightly or not descending in front. Aperture oblique, white inside; peristome thick, reflexed, brown-edged; columella wide, white, obliquely truncated below.

Alt. 47, diam. 30 mill.; oblique alt. of aperture, with peristome 25 mill.

Alt. 44, diam. 28 mill.

S. Nicolas, Nueva Ecija and Candon, Ylocos, Luzon, Philippines.

Helix leucophæa SOW., P. Z. S. 1841, p. 18.—DELESSERT, Recueil t. 39, f. 1.—REEVE, Conch. Icon. Bul. t. 10, f. 50.—PFR., Conchyl. Cab. Bul. t. 52, f. 4; Monogr. ii, p. 5.—*Cochlostyla* (*Orthostylus*) *leucophæa* SEMPER, Reis. Landmoll. p. 206, t. 13, f. 5; t. 18, f. 20 (anatomy).

This species is allied to *C. mus,* but differs notably in being narrower, with longer spire and smaller aperture. The style of coloring reminds one of *C. fenestrata* and *C. curta* (p. 192 of the preceding volume), and its true systematic position is still an open question with me. See also Semper's remarks upon this species. *C. leucophœa* differs from all forms of *C. metaformis* and *rustica* in the dark-edged lip.

C. GLAUCOPHTHALMA Pfeiffer. Pl. 1, fig. 3.

Shell imperforate, ovate-oblong, solid, striatulate; black-chestnut with a streaked brown-ashen hydrophanous cuticle. Spire convex-conoid, the apex dark blue, obtuse; suture impressed; whorls 5, a little convex, the last shorter than the spire, obsoletely angulated at the base. Columella somewhat sloping, dilated, flat, white, somewhat toothed at the base. Aperture oblique, truncate-oval, livid inside; peristome simple, very slightly expanded, the right margin bowed. (*Pfr.*)

Alt. 36, diam. 25 mill.; aperture, alt. 19, width 14.

Philippines (Cuming).

Bulimus glaucophthalmus PFR., P. Z. S. 1851, p. 255; Conchyl. Cab. Bul. p. 89, t. 31, f. 1, 2; Monogr. iii, p. 297.

I have not seen this species. It seems to be allied to *C. mus* and *leucophœa* in contour, and to *C. satyrus var. cyanocephala* in color pattern.

C. SECKENDORFFIANA Pfeiffer. Vol. VII, pl. 37, fig. 49.

Imperforate, turbinate, solid, somewhat glabrous, shining, chestnut-tawny. Spire elevated, apex obtuse, blue. Whorls 5, convex, the last ventricose, not descending in front, the base chestnut-blackish. Columella oblique, wide, white, the base subdentate. Aperture rounded-subtetragonal, whitish inside; peristome subexpanded, brown-edged, the basal margin narrowly reflexed, forming an angle with the columella. Alt. 32, greater diam. 34, lesser 29 mill. (*Pfr.*)

Philippine Is.? (Seckendorff coll.)

Helix seckendorffiana PFR., Zeitschr. f. Mal. 1847, p. 12; Conchyl. Cab. p. 308, t. 52, f. 7, 8; Monogr. i, p. 220.

This species may belong to the section *Calocochlea*, in the neighborhood of *C. dimera*, etc. It is known to me by the description and figures only.

C. SOLIDA Pfeiffer. Pl. 9, fig. 60.

Imperforate, ovate-oblong, solid, obliquely striated. Deep reddish, irregularly streaked with brown-white cuticle. Spire conic, pale above; whorls 7, scarcely convex, the last a little shorter than the spire. Columella straight, subintorted at the base; aperture ear-shaped, subeffuse laterally, whitish within; peristome rather thick, narrowly expanded, reddish-black inside; margins joined by a thin, wide callus. (*Pfr.*)

Alt. 84, diam. 40; aperture, alt. 41, width 25 mill.

Luzon, Philippines.

Bul. solidus PFR., P. Z. S. 1842, p. 152; Monogr. ii, p. 28.—REEVE, Conch. Icon. t. 2, f. 9.

There is a *Calocochlea* of the same name, but later in date (*C. solida* Pfr., MANUAL vol. vii, p. 153); but it will probably prove to be a mere variety or synonym of *C. roissyana.*

Group of C. pictor.

Ovate species, generally covered with a creamy hydrophanous cuticle, which is varied by oblique or zigzag stripes.

C. PICTOR Broderip. Pl. 4, figs. 38, 39, 40, 41.

Imperforate, oblong-conical, varying from ventricose to elongated; solid. Ground color chestnut-brown, becoming purple on the earlier whorls, or rarely becoming paler on the spire. Covered with an opaque white cuticle which is variously marked with irregular stripes of the ground-color, these dark stripes often interrupted and frequently absent on the latter half of the body whorl. The light cuticle is eroded in front of the aperture.

Spire elevated, apex obtuse; whorls 5½, the earlier ones purple (rarely light brown), spirally striated. Aperture purplish inside, oblique; peristome narrowly reflexed, *dark purple-brown.* Columella vertical, white.

Alt. 46, diam. 28, oblique alt. of aperture 24 mill.

Alt. 37, diam. 26, oblique alt. of aperture 22 mill.

Panay, Philippines.

Bulinus pictor BROD., P. Z. S. 1840, p. 120.—*Bulimus pictor* DELESS., Recueil t. 39, f. 11.—PFR., Symbolæ ii, p. 39; Monogr. ii, p. 31.—DH. in Fér. Hist. t. 154, f. 14-17.—REEVE, Conch. Icon, t. 4, f. 19; t. 10, f. 19.—*Bulimus labropurpureus* GRAT., Actes Soc. Linn. Bord. xi, p. 418, t. 4, f. 4.

This species differs from *C. ventricosa* and *fulgetrum* in having a dark purple-brown lip, as well as in some peculiarities of color pattern, and in the usually purple apical whorls. I have never seen specimens with dark-banded ground color (save a narrow columellar band), and this will probably prove another distinctive character. The variation in contour, as well as in size is considerable. Fig. 38 is drawn from the most globose specimen before me, fig. 41 from one of the most slender.

C. SOLIVAGA Reeve. Pl. 3, fig. 30.

Shell somewhat pyramidally ovate, rather thick, slightly ventricose, not umbilicated; whorls 6, smooth; columella a little thickened, arched; lip reflected. Deep chestnut-purple, covered throughout with a whitish hydrophanous epidermis. (*Rve.*)

Philippine Is.

Bulimus solivagus REEVE, Conch. Icon. pl. 74, f. 531, 1849.—PFR., Mon. iii, p. 296.

This species is known by the original example only. It is probably allied to *C. pictor*.

The description of Pfeiffer is as follows; Imperforate, turrited-oblong, solid, black-chestnut, covered with an ashy-white cuticle which is here and there streakedly interrupted. Spire elongate-conic, apex obtuse, chestnut. Whorls 5½, a little convex, the last a little shorter than the spire, obsoletely angled, the base nude. Columella rather straightened, narrow, flat, pale lilac. Aperture oblique, lunate-oval, livid-lilac inside; peristome simple, subexpanded, lilac colored. Alt. 42, diam. 33; aperture, alt. 22, width 14 mill. (*Pfr.*)

C. LEOPARDUS Pfeiffer. Pl. 1, fig. 9.

Imperforate, ovate, rather solid, longitudinally closely costulate-striate; tawny, elegantly variegated with spots and stripes of whitish hydrophanous cuticle. Spire short, conoid, pellucid above; whorls 5, convex, rapidly increasing, the last longer than the spire. Columella long. Aperture very large, rounded-oval, white inside; peristome widely expanded, a little reflexed, edged with chestnut. Alt. 47, diam. 30½; aperture alt. 30, width 22 mill. (*Pfr.*)

Philippines.

B. leopardus PFR., P. Z. S. 1845, p. 67; Monogr. ii, p. 26.—REEVE, Conch. Icon. t. 10, f. 51.

Evidently a more ventricose species than *C. pictor, ventricosa* or *fulgetrum.*

My valued correspondent John Ponsonby, of London, suggests that *C. codonensis* Hidalgo, figured on pl. 53, fig. 37 of the preceding volume of the MANUAL, is closely allied or possibly identical with this species. Having seen neither, I cannot decide the point.

C. VENTRICOSA Chemnitz. Pl. 3, figs. 23, 24, 25, 26, 27, 28, 29, 31.

Imperforate, ventricose, oblong-conoid, solid. Ground color a tawny yellowish-brown, somewhat darker beneath, and frequently having a dark band at periphery, with narrower bands at columella and below the suture. Sometimes having no other pattern, but typically covered with a creamy hydrophanous cuticle which is cut into wide longitudinal bands by narrow, zigzag stripes of the ground color. The dark stripes are usually bordered on one side by opaque creamy stripes of equal width, the hydrophanus cuticle being thinner over the rest of the surface.

Spire elevated, conical, apex rather obtuse. Whorls 6½. Aperture elliptical, oblique, blue-white inside; peristome expanded, reflexed, white; columella vertical, rounded.

Alt. 50, diam. 32; aperture, oblique alt. 29 mill.

Alt. 55, diam. 32; aperture, oblique alt. 31 mill.

Alt. 58, diam. 30; aperture, oblique alt. 29 mill.

Guimaras, Philippines.

Bulla ventricosa CHEMNITZ, Conchyl. Cab. ix, pt. 2, p. 1, t. 117, f. 1007, 1008; *Das bauchichte Blasenschnecke* CHEMN., *t. c.* p. 16, 1786.—*Bulimus ventricosus* BRUG., Encycl. Méth. i, p. 365.—PFR., Symb. iii, p. 88; Conchyl. Cab. t. 58, f. 1–4; Monogr. ii, p. 30.—PHIL., Abbild. iii, *Bul.* t. 7, figs. 1, 5, 6, 9.—*Bul. frater* FER., Hist. t. 112, f. 1, 2.—REEVE, Conch. Icon. t. 6, f. 25.—*B. nobilis* RVE., Conch. Icon. t. 5, f. 20.—*B. guimarasensis* RVE., Conch. Icon. t. 6, f. 24; DH. in Fér. Hist. iv, t. 157, f. 9–12.—*B. decoratus* FER., *l. c.* t. 112, f. 3, 4.

This is a most variable species, approaching *C. fulgetrum* in color and form, but distinguished from it by having a darker ground color and in having the hydrophanous stripes much wider, when present. It differs from *C. pictor* in having the lip invariably white; from all forms of *C. satyrus* in being more ventricose and in lacking a subsutural border.

The color varieties may be classified as follows:

1. Typical *ventricosa* (pl. 3, figs. 25, 28). Ground color olive-brown or tawny-yellowish, having dark bands at periphery, above and below the suture, and usually around the columella. Hydrophanous creamy cuticle generally well developed. The following figures represent this variety: Chemnitz, pl. 117, f. 1007, 1008 (the hydrophanous coat had been worn from the specimen figured); Conchyl. Cab. pl. 58, f. 1, 2; Conch. Icon. pl. 5, fig. 20*b*; Abbild. u. Beschreib. iii, *Bul.* pl. 7, fig. 9. Other forms of the typical variety have the dark bands very faint or lacking (pl. 3, figs. 24, 26), and the hydrophanous cuticle prominently developed. In a few specimens before me the characteristic zigzag dark stripes are absent (fig. 24).

2. Scarcely separable from this is the form called GUIMARASENSIS Reeve (pl. 3, fig. 31), which has the same ground color, but lacks hydrophanous creamy markings. The bands are usually narrower than in fig. 31. Besides Reeve's figures, the following illustrations represent this variety: Fér. Histoire, iv, pl. 157, figs. 9–12; Conchyl. Cab. pl. 58, fig. 4.

3. The var. DECORATA Fér. (pl. 3, figs. 27 and 29) is light colored and shows a band at periphery, usually continuing up the spire above the suture, and often a second faint band below the suture. Figs. 3, 4 of pl. 112, Fér. Hist.; figs. 5, 6, pl. vii of Phil., Abbild.; and figs. 20*a*, 25 of Conch. Icon. represent this form.

A form also occurs without the peripheral girdle (pl. 3, fig. 23). This has received the name of *frater* Fér. See Fér. Hist. pl. 112, figs. 1, 2, and Phil. Abbild. iii, pl. 7, fig. 1.

Compare also, on all these forms, Hidalgo, Journ. de Conchyliologie 1887, p. 184, 185.

C. APLOMORPHA Jonas. Pl. 12, fig. 11.

Imperforate, oblong-conic, elongated, solid; lower two whorls tawny-brown, with broad dark brown bands at suture and periphery, and covered with a thin white cuticle worn into streaks; next earlier whorl light brown, the upper whorls white.

The spire is long, conical, apex obtuse, Whorls 6. Aperture decidedly shorter than the spire, white within; peristome expanded and reflexed, white; columella gently arcuate, not truncated below, white. Alt. 41, diam. 24; oblique alt. of aperture 22½ mill.

Philippines.

Bulimus aplomorphus JONAS, P. Z. S. 1842, p. 189.—PHILIPPI, Abbild. u. Beschreib. ii, *Bul.* t. 6, f. 1.—? REEVE, Conch. Icon. t. 10, f. 47.

This form differs from *C. ventricosa* in being smaller, slenderer, with somewhat higher spire. It may, perhaps, prove to be connected by intermediate specimens with *ventricosa*. The single specimen before me agrees with Philippi's figures in all respects except that it is frosted over with silvery cuticle.

C. VELATA Broderip. Pl. 12, fig. 12.

Imperforate, ovate-oblong, solid; yellowish, ornamented with two bands and a basal area of chestnut, veiled with a whitish hydrophanous cuticle. Spire conic, apex obtuse. Whorls 6, scarcely convex, the last about equal to three-sevenths the entire length. Columella nearly straight, slightly dilated, rose-white; aperture oval, milk-white within; peristome somewhat thickened, narrowly reflexed, brown-edged. (*Pfr.*)

Alt. 44, diam. 21; aperture, alt. 21, width 12 mill.

Camotes Is., Philippines.

Bulinus velatus BROD., P. Z. S. 1841, p. 15.—*Bulimus velatus* PFR., Monogr. ii, p. 31.—REEVE, Conch. Icon. t. 11, f. 57.

Compare *C. aplomorpha.*

C. LIBROSA Pfeiffer. *Unfigured.*

Imperforate, ovate-oblong, solid, striatulate, covered with a somewhat hydrophanous cuticle of a parchment-ashen color, irregularly streaked and at the suture ocellated with brown. Spire a little convexly conic, obtuse; whorls 5½, nearly flat, the last slightly shorter than the spire, shining dark chestnut; the cuticle deciduous around the pale, compressed, somewhat straightened columella. Aperture oblique, oval-oblong, bluish inside; peristome chestnut-black, somewhat thickened, revolute, the right margin lightly arcuate. (*Pfr.*)

Alt. 40, diam. 21; aperture, alt. 19, width 11 mill.

Palawan, Philippines.

B. librosus PFR., P. Z. S. 1856, p. 388; Monogr. iv, p. 375.

Very similar in appearance to *C. velata*, according to Pfeiffer.

C. FULGETRUM Broderip. Pl. 4, figs. 32, 33, 34, 35.

Imperforate, oblong-conoid. Ground color light yellow or light brown, paler on the spire, frequently having a dark band at the columella; hydrophanous cuticle thin and rather deciduous, marked

by rather separated oblique or zigzag cream-white stripes, which are often accompanied by stripes of the ground color.

Spire elevated, conic, apex obtuse; whorls 6. Aperture elliptical, white or faint lilac inside; peristome expanded and reflexed, white; columella vertical.

Alt. 54, diam. 31; aperture, oblique alt. 31 mill.

Alt. 59, diam. 34; aperture, oblique alt. 33 mill.

Alt. 45, diam. 29; aperture, oblique alt. 28½ mill.

Guimaras, Negros and Panay, Philippines.

Bulinus fulgetrum Brod., P. Z. S. 1840, p. 119.—*Bulimus fulgetrum* Delessert, Rec. t. 39, f. 7, 8, 9.—Reeve, Conch. Syst. ii, t. 172, f. 4; Conch. Icon. t. 5, f. 23.—Pfr., Monogr. ii, p. 31; Conchyl. Cab. p. 210, t. 59, f. 4–7.—*B. ventricosus var.* Dh. in Fér. Hist. t. 145 A, f. 11, 12.—*Cochlostyla fulgetrum* Hidalgo, Journ. de Conchyl. 1887, p. 184.

Typical specimens, when not rubbed, show a thin film of whitish cuticle with occasional narrow, white zigzag or oblique stripes, each bordered behind by a denuded stripe of the same width. These stripes are often very short. Specimens having a dark peripheral band also occur. The color pattern is about all that separates this species from *C. ventricosa*.

Group of C. satyrus.

Oblong species, usually dark with a brownish or ashen cuticle, streaked in the direction of growth lines.

C. satyrus Broderip. Pl. 2, figs. 13–18; pl. 1, figs. 5, 6.

Imperforate, ovate-elongate, solid, smooth. Ground color chestnut-brown, darker beneath, becoming very pale on the spire, the earlier 3 whorls usually *whitish* (rarely light orange-brown); covered with a hydrophanous whitish, brown-tinted or ashen cuticle, which is more or less streaked obliquely. *There is a narrow dark or light margin below the suture,* rarely wanting.

The spire is conoidal, longer than the aperture. Apex rather obtuse; suture but slightly impressed. Whorls 6, the last not descending. Aperture oblique, ovate, bluish-white inside; lip brown-edged; columella purplish-pink, slightly truncated below.

Alt. 44, diam. 28 mill.; oblique alt. of aperture 25 mill.

Alt. 54, diam. 28 mill.; oblique alt. of aperture 29 mill.

Tablas (Cuming); *Albay and Palawan* (Phil. Acad. Coll.); *Philippines.*

Helix (*Cochlostyla*) *satyrus* BROD., P. Z. S. 1840, p. 181.—*Bul. satyrus* PFR., Monogr. ii, p. 13.—REEVE, Conch. Icon. f. 29.—*B. palawanensis* PFR., P. Z. S. 1856, p. 388; Monogr. iv, p. 372.

This species is less solid than *C. leucophæa*, and has a more oval and lengthened body whorl. It differs from the preceding forms in lacking oblique or zigzag denuded stripes.

The typical *C. satyrus* (pl. 2, fig. 13) is rather conoidal, with light colored upper whorls and nearly uniform cuticle. Specimens before me from Albay seem to be typical.

A specimen is shown in fig. 15 which differs in being longer, much streaked with blackish, in lacking the subsutural line, and in having an orange apex. This may be more nearly related to the *C. palawanensis*.

A variety which may be called v. *minima* is shown in figs. 5, 6, of pl. 1. The cuticle is light, uniform where not eroded; whorls 5 to 5½, the earlier whorls whitish, having a brown band bordering the suture above, and the last 1½ whorls have a narrow brown band below the suture, unfortunately omitted in the figures. Columella pure white. Alt. 34, diam. 23; oblique alt. of aperture 20 mill.

Figures 16, 17, 18 of plate 2 represent a form collected upon the Island of Palawan, which I take to be the *palawanensis* of Pfeiffer. The shells have either a light chestnut (fig. 16) or a black (figs. 17, 18) ground color, becoming, in all cases, very light on the spire, the earlier whorls whitish, showing a faint brown line above the suture. The last three whorls always have a dark line bordering the suture below, and this line has a tendency to emit short flames below (figs. 16, 17), especially upon the spire. The hydrophanous cuticle is persistent, ashy, becoming black on the body whorl in specimens having dark ground color. The lip is black or brown. The columella is rounded, and of a purple color in dark, white in light shells. The spire is wide, apex obtuse, sutures very shallow.

Var. *cyanocephala* Pils. Pl. 2, fig. 14.

Ground color dark brown on the last 1½ whorls, becoming light yellow on the next earlier, *the upper whorls dark blue;* hydrophanous cuticle ashy brown, streaked with black; sutural band indistinct or wanting. Columella pink or white.

Borneo (R. F. Geale); *Palawan.*

C. GRAELLSI Hidalgo. Pl. 5, figs. 2, 3.

Imperforate, ovate or oblong, solid, nearly smooth; chestnut colored, covered with a streaked hydrophanous cuticle, the streaks

oblique, close, whitish, more or less tawny. Spire conic, apex obtuse. Whorls 6, slightly convex, the earlier 3 white, ante-penultimate pale tawny, the rest chestnut colored, the last a little shorter than the spire. Columella nearly straight, whitish-fleshy, a little calloused. Aperture oval, obliquely subtruncate above, blue-white inside; peristome somewhat thickened, reflexed, blackish-brown. (*Hid.*) Alt. 43, diam. 24; aperture, alt. 19, width 13 mill.

Entire Island of Balabac, Philippines.

C. graellsi Hid., Journ. Conch. 1886, p. 155, t. 8, f. 5.

This species much resembles *C. satyrus* Brod. and *cinerosus* Pfr. In *satyrus* the cuticle is unicolored and darker, in *cinerosus* the flammules are wider, more spaced, and they terminate a short distance from the suture. In this species there is a dark line below the suture on the last two whorls. (*Hid.*)

C. cinerosa Pfeiffer. Pl. 1, fig. 4.

Imperforate, ovoid, solid, obliquely striatulate; brown, covered with a dark ashen cuticle which is worn off in streaks.

Spire convex-conic, apex obtuse. Whorls 5, moderately convex, the last a little shorter than the spire. Columella subplane, slightly dilated forward, white. Aperture oblique, truncate-oval, whitish inside; peristome subsimple, narrowly expanded.

Length 36½, diam. 13 mill.; length of aperture 20, breadth 14 mill. (*Pfr.*)

Palawan, Philippines.

Bul. cinerosus Pfr., P. Z. S., 1855, p. 107, t. 32, f. 5; Monogr. iv, p. 375.

The small size, obtuse spire and streaked cuticle are prominent marks of this species, but it may prove to be only a small form of *C. satyrus*.

C. cæsar Pfeiffer. Pl. 5, fig. 1.

Imperforate, globose-conic, thin, nearly smooth, white under a deciduous tawny cuticle; spire conoid, apex obtuse; whorls 5½, moderately convex, the last about equalling the spire. Columella nearly vertical, flat, white, truncate-dentate. Aperture subdiagonal, lunate-rounded, white inside; peristome white, narrowly expanded, the right margin dilated forward above. (*Pfr.*)

Alt. 46, diam. 33; aperture, alt. 23, width 19 mill.

Philippines.

Bulimus cæsar PFR., P. Z. S., 1854, p. 293; Monogr. iv, p. 357. —*Cochlostyla cæsar*, HIDALGO, Journ. de Conch. 1887, p. 168, t. 6, f. 4.

Section XI. HYPSELOSTYLA Martens, 1868.

Cochlostylæ elongatæ MARTENS, Ostas. Zool. Landschn. p. 98, 1867.—SEMPER, Reisen Landmoll. p. 208.—*Hypselostyla* MARTENS *MS.*, PFR., Monogr. Hel. Viv. vi, p. 7, 15 (for *C. nympha* and *C. dactylus*).—PFR. CLESS., Nomencl. Hel. Viv. p. 207, 1878 (as synonym of *Orthostylus*).—MILDFF., Landschn. Cebu p. 243, 1890.

The shell is imperforate, narrow and elongated, usually rather thin and somewhat carinated at the periphery; peristome more or less expanded but not broad; no umbilical fissure.

Group of C. cincinna.

Species with light ground color, with or without bands. Hydrophanous cuticle wanting or very inconspicuous.

C. CINCINNA Sowerby. Pl. 10, figs. 1, 2, 3, 4, 5.

Imperforate, lengthened, pyramidal, *solid* but not thick; surface shining, white, pink or pink-brown, with or without a darker columellar patch, and usually having the last whorl irregularly streaked and speckled with brown cuticle.

The spire is long, apex obtuse; whorls 6½, slightly convex, the last well rounded. Aperture oblique, small; *peristome blunt, very slightly* or not expanded; columella vertical, usually somewhat truncated below.

Alt. 46, diam. 25; oblique alt. of aperture 22 mill.

Alt. 40, diam. 25; oblique alt. of aperture 20 mill.

Romblon; Temple and Burias, Philippines.

Helix cincinnus SOWB., P. Z. S., 1840, p. 98.—*Bul. cincinnus* PFR., Monogr. ii, p. 9; Conchyl. Cab. p. 182, t. 53, f. 10–13.—REEVE, Conch. Icon. t. 7, f. 30.—*Cochlostyla cincinna* SEMPER, Reisen Arch. Phil. Landmoll. p. 211.—*Bulimus labiozonalis* GRAT., Actes Soc. Linn. Bord. xi, p. 419, t. 4, f. 13.—*Bul. gracilis* LEA, Proc. Am. Philos. Soc. i, p. 173; Trans. Am. Philos. Soc. vii, p. 456, t. 11, f. 6.—*Bul. spretus* REEVE, Conch. Icon. t. 85, f. 633.—*B. virens* PFR., P. Z. S., 1842, p. 153; Monogr. ii, p. 8.—REEVE, Conch. Icon, t. 7, f. 32.—*B. romblonensis* PFR., P. Z. S. 1842, p. 152.—REEVE, Conch. Icon. f. 34.—*B. pastorella* VAL.

The more typical forms have the periphery quite rounded, the lip scarcely expanded, and the apex is never of a different color from the spire.

Typical *cincinna* (pl. 10, figs. 1, 2) is white, or very pale buff, unicolored or having the columellar area pink, or the columellar area brown and the lip pink; dark patches of cuticle may be either present or absent.

Var. *gracilis* Lea (pl. 10, fig. 5) is a dark variety, but under the name may be included the pink and pink-brown examples (figs. 3, 4).

Var. *virens* Pfr. (pl. 10, fig. 10) is white, becoming pale green below. It is from the island *Burias*.

Var. *spretus* Reeve (pl. 10, fig. 8) is "pale straw color, chestnut-black around the umbilicus and edge of the aperture, covered toward the base with a thin burnt-brown epidermis. It differs from *cincinnus* in being of a more truly conical form." Habitat, Romblon.

Var. *romblonensis* Pfr. (pl. 9, fig. 58; pl. 6, fig. 23) has the form of typical *cincinna*. It is white or pallid buff, with dark bands at suture and periphery and a dark columellar area. Lip colored or not. This form has been united with *C. subcarinata*, but erroneously, that species having the lip more expanded than this. Fig. 23 is drawn from a specimen before me.

C. SUCCINCTA Reeve. Pl. 10, fig. 14.

Imperforate, ovate-pyramidal; rather solid, smooth; white, with one or two chestnut bands and a blackish-chestnut basal area.

Spire elongated, rather obtuse; whorls 7, slightly convex, the last about two-fifths the entire length, rounded. Columella white, somewhat twisted. Aperture oblique, truncate-oblong; peristome brown, scarcely thickened, very narrowly reflexed. (*Pfr.*)

Alt. 62, diam. 28; aperture, alt. 26, width 15 mill.

Philippines.

Bul. succinctus REEVE, Conch. Icon. t. 74, f. 534 (1849).—PFR., Monogr. iii, p. 310.

I have not seen this form. It may prove to be merely a further development of the *cincinna-romblonensis* stock, but it is larger than any *cincinna* I have seen.

C. CINCINNIFORMIS Sowerby. Pl. 6, figs. 21, 22, 24.

Imperforate, ovate-pyramidal, rather thin; white or very pale buff, having dark brown bands above and below the sutures, at the periphery and around the columella: the subsutural and frequently the peripheral band tessellated with hydrophanous yellow spots.

The spire is elevated, but rather wide. Apex obtuse, purple or white; whorls 5¾, slightly convex, the last angulated more or less distinctly at the periphery. Aperture oblique, showing the bands distinctly inside. *Peristome thin, distinctly but very narrowly expanded*, white, stained with purple at the terminations of the bands. Columella straight above, somewhat truncate below.

Alt. 48, diam. 27; aperture, alt. 20 mill.

Alt. 36, diam. 24; aperture, alt. 18 mill.

Alt. 34, diam. 25; aperture, alt. 19½ mill.

Luban, Philippines.

Helix cincinniformis SOWB., P. Z. S., 1841, p. 17.—*Bulimus cin.* PFR., Monogr. ii, p. 9; Conchyl. Cab. p. 181, t. 53, f. 6, 7.—REEVE, Conch. Icon. t. 6, f. 28.—DESH. in Fér. Hist. t. 157, f. 3, 4.

This species is closely allied to *C. cincinna* and *C. subcarinata*. It differs constantly from the variety *romblonensis* of the former species in being a less elongated shell, *thinner* in texture, and with *thin*, narrowly expanded lip, and in having the upper part of the spire decidedly stouter. Figure 23 of pl. 6 represents a specimen of *cincinnus var. romblonensis*.

The differences are made clearer in the following comparison:

C. cincinna var. romblonensis.	*C. cincinniformis.*
Shell slender, with narrow, straight-sided spire.	Shell stouter, the outlines of spire convex above.
Dark bands not spotted.	Dark bands spotted with light spots.
Shell solid.	Shell thin.
Lip dark, obtuse.	Lip white, except at the terminations of the bands, thin, narrowly expanded.

Semper has considered this species a form of *cincinna*, but although it is certainly closely allied I prefer to see intermediate specimens before uniting them. My artist has omitted the light flecks upon the bands in fig. 22.

In one of the specimens before me the space between the peripheral and basal bands is covered with chestnut colored lineolate cuticle.

C. CARNEOLA Grateloup. Pl. 7, fig. 41.

Oblong-conoid, fleshy-white, fragile, pellucid, very shining; very finely longitudinally striated. Aperture semi-ovate, base rounded; columella subintorted; whorls 6, slightly convex. Alt. 35, diam. 25 mill. (*Grat.*)

Manila (?), Philippines.

Bulimus carneolus GRAT., Actes. Soc. Linn. Bord. xi, p. 417, t. 3, f. 25.

This is a young shell, which Pfeiffer surmises to be a unicolored form of *C. cincinniformis*. The locality given cannot be correct.

C. SUBCARINATA Pfeiffer. Pl. 9, fig. 59; pl. 11, figs. 16, 17, 18.

Imperforate, elongated, the spire conic, elevated. Surface shining, most minutely spirally and obliquely striated, of a *delicate green tint* fading into white on the spire, having (typically) a *golden-brown sutural band flecked with golden-yellow.* Body whorl often retaining patches of thin brownish cuticle. Whorls 6, the apex obtuse, earlier two whorls convex, the remainder nearly flat, *obtusely angular* at the periphery; aperture rhomboidal, oblique; white within; *peristome thin, expanded;* columella subvertical, arcuate.

Alt. 44, diam. 24; oblique alt. of aperture 22½ mill.

Romblon (Cuming); *Marinduque* (Steere Exped. and Hidalgo).

Bulimus subcarinatus PFR., P. Z. S., 1842, p. 153; Monogr. ii, p. 8.—REEVE, Conch. Icon. f. 35.—*Cochlostyla eburnea* HIDALGO, Journ. de Conch. 1887, p. 186, *not* of Reeve.—*Cochlostyla möllendorffi* HIDALGO, Journ. de Conchyl. 1887, p. 187, t. 7, f. 3.

This species differs from *C. cincinna* and its varieties in being of a less solid texture, in having the lip distinctly expanded, and in being more distinctly subcarinate.

Typically the color is a very delicate green tint, with a golden flecked sutural band, and often some traces of thin brownish cuticle on the body whorl; columella and lip white (pl. 9, fig. 59; pl. 11, fig. 16).

This is varied by the darkening of the sutural border, the addition of a circum-columellar black-brown zone, and a dark brown edge to the lip. This is the form which Hidalgo has named *C. möl-*

[illegible]. It is found associated with typical *subcarinata* in Marinduque (pl. 11, figs. 18, 19, 21).

Still another form is shown in fig. 17. It has a black-chestnut band at suture, periphery and columella, but the lip is pure white. This also lives associated with the preceding. It may be distinguished from the similarly marked *C. cincinna* var. *[illegible]* by the thin, expanded lip.

C. EVANESCENS Broderip. Pl. 7, fig. 38.

Imperforate, ovate-conic, thin; whitish, ornamented with a sutural line and a basal area of chestnut; spire conical, rather obtuse; whorls 6, nearly flat, the last rounded, almost equal to three-sevenths the entire length. Columella straight, ashen. Aperture lunate-oval, milk-white inside; peristome thin, expanded, basal margin forming an angle with the columella. (*Pfr.*)

Alt. 33, diam. 19; aperture, alt. 16, width 11 mill.

Luzon, Philippines.

Bulimus evanescens BROD., P. Z. S., 1841, p. 15.—*Bulimus evanescens* "Pfr.," REEVE, Conch. Icon. t. 13, f. 72.—*B. evanescens* Brod., PFR., Monogr. ii, p. 10.

This seems to be very closely allied to *C. subcarinata*. I have not seen specimens. Two varieties are recorded: β, unicolored white, and γ, pale tawny, with darker band at the suture, basal area and peristome black.

C. EBURNEA Reeve. Pl. 10, figs. 9, 11.

Imperforate, pyramidal, elongated, *pure white* or covered with a very thin cuticle of an excessively pale buff tint; polished; showing under a lens, fine growth striæ and spiral incised lines.

Spire high, apex obtuse; whorls 6, slightly convex, the last slightly descending in front. Aperture oblique, ovate; *peristome thin, expanded;* columella vertical, not arcuate or concave, slightly truncated at the base.

Alt. 39, diam. 22; oblique alt. of aperture 20 mill.

Tayabas, Luzon, Philippines.

Bulimus eburneus REEVE, Conch. Icon. t. 13, f. 74 (not *Cochlostyla eburnea* Hidalgo, J. C. 1887, p. 186. Not *Bul. eburneus* Pfr., a species of *Buliminus*).—*B. politus* REEVE, in corrigenda to *Bul.* Conch. Icon.—PFR., Monogr. iv, p. 372.

This is a pure white shell having the periphery rounded as in *C. cincinna*, from which it differs in having the lip decidedly

expanded. In the last character it is like *C. subcarinata*, but the constant epidermal subsutural band of that species is lacking in *eburnea*.

Fig. 11 is incorrect in showing the columella arcuate. In the specimen from which that figure was drawn, as well as in all others which I have seen, the columella is straight above, subtruncate below.

Group of C. carinata.

Species having the ground color either dark or light. Covered with a variously patterned, conspicuous hydrophanous cuticle.

C. NIMBOSA Broderip. Pl. 4, figs. 36, 37.

Imperforate, ovate-conic, elongated. Ground color chestnut-brown (or light green), with a dark columellar tract and usually a narrow peripheral band; irregularly speckled and longitudinally flamed with cream-white or brown hydrophanous cuticle, the flames usually zigzag; apical whorls orange or light brown.

Spire conical, elevated; whorls 6½. Aperture shorter than the spire, oblique; peristome expanded, somewhat reflexed, flesh colored or brown. Columella vertical.

Alt. 63, diam. 36; oblique alt. of aperture 32 mill.

Alt. 62, diam. 34; oblique alt. of aperture 30 mill.

Negros and Panay, Philippines.

Bulinus nimbosus BROD., P. Z. S., 1840, p. 121.—*Bulimus nimbosus* PFR., Monogr. ii, p. 30; Conchyl. Cab. p. 209, t. 59, f. 3.—REEVE, Conch. Icon. t. 4, f. 17.—DESH. in Fér. Hist. t. 145 A, f. 18, 19.—*B. pfeifferianus* REEVE, Conch. Icon. t. 4, f. 18.

This species is the largest of the section *Hypselostyla*. It is closely allied to *C. nympha*, differing in its larger size and the more expanded and lighter colored lip. Compared with *C. ventricosa* and *fulgetrum* this species is seen to have a more pyramidal, narrower spire and the hydrophanous cuticle is more speckled. The figures are drawn from typical specimens in the Philadelphia collection.

The color variety *pfeifferiana* Rve. (fig. 37) has a light yellowish-green ground color, with the usual dark columellar patch, but without a peripheral band.

C. ELEGANS Semper. Pl. 13, fig. 55.

Imperforate, ovate-oblong, thin, tawny, with a very elegantly marbled and flamed cuticle of pale brown.

Spire conic, obtuse; apex nude, rufous; whorls 6, scarcely convex, the last slightly shorter than the spire, subangulated; columella somewhat twisted, longitudinally biangulate, entering. Aperture oblong-subpyriform, whitish within; peristome thin, narrowly expanded, the right margin dilated above and below, basal margin forming an obsolete angle with the columella. (*Pfr.*)

Alt. 52, diam. 25; aperture alt. 27, width 15 mill.

Siquijor, Philippines.

Bulimus siquijorensis Pfr., P. Z. S., 1845, p. 74; Monogr. ii, p. 12—Reeve, Conch. Icon. t. 8, f. 42 (not *Carocolla siquijorensis* Brod. 1841, also a Cochlostyla).—*Cochlostyla elegans* Semper, Reis. Landmoll. p. 210.

C. carinata Lea. Pl. 13, figs. 53, 54.

Imperforate, elongated, the spire turrited-conic, the body whorl carinated. Tawny-brown, darker below, fading to a light brown on the spire, the apical whorls a trifle darker; usually in part or almost entirely denuded of the thin creamy-brown hydrophanous cuticle which is disposed in ragged oblique streaks.

Spire long, straight-sided, the earlier two whorls forming a somewhat bulbous apex. Whorls 7 to 7½, the first two convex, the rest flat, the last whorl angular at the periphery, somewhat swollen above and frequently subangular there also. Aperture oblique, broad below, white or livid inside; peristome dark brown, expanded, *receding below;* columella long, white, straight, somewhat receding.

Alt. 64, diam. 29; oblique alt. of apert. 31 mill.

Lucban, prov. of Tayabas, Luzon; Albay; Catanduanes Is., Philippines.

Bulimus carinatus Lea, Proc. Amer. Philos. Soc. i, p. 174 (read Feb. 21, 1840; Proc. for Jan. and Feb. 1840 distributed March 20, 1840); Trans. Amer. Philos. Soc. vii, p. 458, t. 11, f. 7, 1841.—*Bulinus dactylus* Brod., P. Z. S., 1840, p. 158 (read Nov. 24, 1840).—*Bulimus dactylus* Pfr., in Conchyl. Cab. p. 209, t. 59, f. 1, 2; Monogr. ii, p. 32.—Reeve, Conch. Icon. t. 8, f. 39.—*Cochlostyla dactylus* Brod., Semper, Reis. Landmoll. p. 210.—Hidalgo, Journ. de Conchyl. 1887, p. 169.

The priority of Lea's name *carinatus* over that given by Broderip, *dactylus,* cannot be questioned. I have examined Lea's type, a large and finely developed specimen.

In its typical form, *C. carinatus* is readily distinguished from *C. nympha* by its larger size and pronounced keel; but intermediate specimens are numerous.

As a varietal form the name *dactylus* may stand for the non-carinated, highly variegated examples (fig. 54).

Var. NYMPHA Pfr. Pl. 13, figs. 60, 61.

The form is oblong-turrited; color a varying tint of brown, darker on the base, fading on the spire, the suture generally having a dark border, the columella encircled by an ill-defined dark patch. The hydrophanous cuticle varies from creamy to brown; it is more or less streaked or torn into shreds lengthwise, and usually there are wide flames springing from the sutures. The spire is flesh-colored or purplish above. Whorls 6½. Aperture white or flesh-tinted inside; peristome *slightly* expanded, dark brown; columella white, vertical.

Alt. 51, diam. 26; oblique alt. of aperture 24 mill.

Alt. 47, diam. 24; oblique alt. of aperture 22 mill.

San Mateo, prov. Manilla; Tabaco and Daraga, prov. Albay, Luzon; Marinduque, Philippines.

Bulimus nympha PFR., P. Z. S. 1842, p. 89; Monogr. ii, p. 13; Conchyl. Cab., p. 170, t. 51, f. 3.—REEVE, Conch. Icon., t. 8, f. 41. —DESH. in Fér., Hist. t. 145 A, f. 3, 4.—*Cochlostyla nympha* SEMPER, Reisen, Landmoll., p. 209.—HIDALGO, Journ. de Conch. 1887, p. 170.

Specimens before me recently collected in Marinduque are nearly destitute of hydrophanous cuticle except for a series of golden spots tesselating the dark sutural band. The columella is surrounded by a wide, black-brown, *sharply defined* band. Periphery angular (fig. 61.)

C. TURRIS Semper. Pl. 13, fig. 56.

The young shell is turrited, imperforate, solid, brown, streaked with a hydrophanous whitish-buff cuticle. Spire much elevated, apex rather acute; whorls 8½, but little convex, the last subangular. Columella vertical, twisted. Aperture semioval; peristome? (*Semper.*) Alt. 92, diam. 37 mill.

Near Satpat and Amberbuk, Iraya Mts.

C. turris SEMP., Reis. Landmoll., p. 210, t. 9, f. 3.—*cf.* HIDALGO, Journ. de Conch. 1887, p. 170.

This species evidently stands close to *C. dactylus,* and it is not impossible that it should be considered a variety of that species; but the widely separated localities (Albay and the mountain valleys of the eastern Cordillera, opposite Palanan), the greater number of whorls, the much larger size (92 against 73 mill.), seems to me to render it necessary to specifically separate this longest of all Cochlostylas, at least temporarily, in spite of the fact that the single example before me is immature. (*S.*)

C. DIANA Broderip. Pl. 11, figs. 22, 23, 30, 31.

Imperforate, elongated, turrited. *Ground color pale yellow, fading above, the earlier two whorls pure white.* More or less marked on the body whorl with longitudinal white hydrophanous stripes. *Aperture, lip and columella pure white.*

Alt. 47, diam. 22; aperture, alt. 23 mill.
Alt. 45, diam. 25; aperture, alt. 25 mill.
Alt. 35, diam. 20; aperture, alt. 18 mill.

Island of Negros, Philippinse.

Bulinus diana BROD., P. Z. S., 1840, p. 157.—*Bulimus diana* REEVE, Conch. Syst. ii, t. 172, f. 2; Conch. Icon, t. 8, f. 40.—PFR., Conchyl. Cab. p. 208, t. 58, f. 8, 9; Monogr. ii, p. 32.

Bulinus calista BROD., P. Z. S., 1840, p. 157.—DELESSERT, Recueil, t. 39, f. 5.—PFR., Monogr. ii, p. 12; Conchyl. Cab. p. 169, t. 51, f. 2.—DESH. in Fér. Hist. t. 145 A, f. 1, 2.—REEVE, Conch. Icon. t. 8, f. 38.

The typical *C. diana* is known by its light yellow color and white apex and aperture. It varies much in degree of elongation, and in carination, some specimens being as distinctly carinated as *C. carinata* Lea.

All manner of transition forms between *calista* and *diana* occur; one is shown in pl. 11, fig. 30. This specimen is yellowish-green, longitudinally clouded with white hydrophanous cuticle; the earlier two whorls are ivory white, the lip dark brown, columella encircled by a purple-brown area.

Var. CALISTA Brod. Pl. 11, figs. 24, 25.

Two apical whorls orange-brown; lip brown-edged; columella surrounded by a brown band.

This is merely a color-phase of the *C. diana,* and is found in the same localities.

C. CALYPSO Broderip. Pl. 12, fig. 3.

Imperforate, ovate-pyramidal, very minutely striated; diaphanous; buff-white, ornamented with greenish bands and a chestnut basal area. Spire pyramidal, apex obtuse, purple-brown. Whorls 6, rather flat, the last a little shorter than the spire, subangular in the middle. Columella thickened, somewhat twisted, flesh colored. Aperture lunate-oval, milk-white within; peristome narrowly expanded, edged with chestnut. (*Pfr.*)

Alt. 40, diam. 21; aperture, alt. 21, breadth 13 mill.

Negros, Philippines.

Bulinus calypso BROD., P. Z. S., 1840, p. 158.—*Bulimus calypso* PFR., Monogr. ii, p. 11.—REEVE, Conch. Icon. t. 7, f. 31.

Seems to be closely allied to *C. calista.*

C. CAMELOPARDALIS Broderip. Pl. 12, figs. 4, 5.

Imperforate, elongated, turrited. Light brownish-yellow, becoming browner below, the earlier (embryonic) 2 whorls orange-brown; the remaining whorls have longitudinal stripes of cream-white cuticle. Spire long, apex obtuse; whorls 7 to 7½, the earlier 2 quite convex, the rest nearly flat; body-whorl obviously or almost imperceptibly subcarinated. Aperture narrow, elliptical, white inside, the lip expanded, dark brown. Columella visibly twisted, brownish or fleshy-white, surrounded by a purplish callus.

Alt. 51, diam. 22; oblique alt. of aperture 21 mill.

Alt. 49, diam. 22; oblique alt. of aperture 22½ mill.

Zebu and Camotes Is., Philippines.

Bulinus camelopardalis BROD., P. Z. S., 1840, p. 157.—*Bulimus camelopardalis* PFR., Monogr. ii, p. 12; Conchyl. Cab. p. 178, t. 52, f. 8, 9,—*B. cameleopardalis* RVE., Conch. Icon. t. 8, f. 36.—*Cochlostyla camelopardalis* SEMPER, Reisen, Landmoll. p. 208, t. 8, f. 13; t. 18, f. 19 (anatomy).—HIDALGO, Journ. de Conch. 1887, p. 168. —MLLDFF., Landschn. Cebu, p. 244.

The extremely slender form and the style of marking (the stripes being mainly longitudinal and neither zigzagged nor oblique except on the base) constitute the principal characters of this form. Neither of these characters is of much value, the alleged differences in contour between *camelopardalis* and *boholensis* being readily bridged by many specimens before me.

Var. BOHOLENSIS Brod. Pl. 12, figs. 6, 7, 8, 9, 10.

Shell lengthened, but variable in degree of elongation; subcarinated or almost rounded at the periphery; whorls 6½ to 7½. Ground color yellowish, becoming tawny below, paler above, the earlier two or three whorls brown, covered with a cream-white hydrophanous cuticle, which is cut by zigzag stripes (figs. 8, 10) or by spots (fig. 9) of the ground color. Lip dark brown.

Alt. 42, diam. 22; aperture, alt. 22 mill. (fig. 6).

Alt. 49, diam. 20½; aperture, alt. 22½ mill. (fig. 10).

Maribojoc, Bohol, Philippines.

Bulinus boholensis BROD., P. Z. S., 1840, p. 158.—*Bulimus boholensis* REEVE, Conch. Syst. ii, t. 172, f. 3; Conch. Icon. t. 8, f. 37.—PFR. in Conchyl. Cab. p. 178, t. 52, f. 10, 11; Monogr. ii, p. 13.—DESH. in Fér. Hist. t. 145 A, f. 9, 10.—*Cochlostyla boholensis* SEMPER, Reisen, Landmoll. p. 208.

There are often dark bands upon the light ground color, at suture, periphery and columella, as shown in figs. 7, 9; but these are as frequently lacking. Figs. 6, 7, 9, 10, drawn from specimens now before me, show that the pattern of cuticle is excessively variable. Fig. 8 is also a common pattern.

This form is so intimately related to *C. camelopardalis* that I can only admit it to the rank of a local variety, characterized by the color pattern only.

C. HAINESI Pfeiffer. *Unfigured.*

Imperforate, ovate-conic, solid, obliquely lightly striated, chestnut colored, painted with undulating streaks and yellow shreds. Spire elongate, subconcave-conic, apex violet, rather acute. Whorls 6½, a little convex, the last scarcely two-fifths of the entire length, subangulate below the middle. Columella little sloping, livid flesh color. Aperture oblique, lunate-round; peristome expanded and narrowly reflexed, violet-brown. Alt. 52, diam. 27 mill.; aperture (with peristome), 27 mill. long, 17 wide. (*Pfr.*)

Philippines.

Bul. hainesi PFR., P. Z. S., 1855, p. 115; Monogr. iv, p. 357.

Group of C. concinna.

Conic-pyramidal species, having hydrophanous cuticle, the columella rather wide and white.

C. CONCINNA Sowerby. Pl. 11, figs. 26, 27, 28.

Imperforate, pyramidal-conic, the last whorl *angulated at the periphery*, somewhat flattened at the base. Yellowish-brown, having darker lines at suture and periphery (often lacking) and a dark brown columellar patch; *variegated with irregular streaks and angular spots of whitish hydrophanous cuticle, which on the base forms two interrupted bands. Apex and upper portion of the earlier* 1½ *whorls purplish-brown.*

Spire conic, *apex very obtuse;* whorls 6 to 6½. Aperture oblique, flesh colored inside, the lip expanded and edged with brown. Columella wide, *flat*, white, more or less distinctly truncated at base.

Alt. 34, diam. 20; oblique alt. of aperture 17 mill.

Alt. 30, diam. 19½; oblique alt. of aperture 16 mill.

Tuguegarao, Cagayan; Northwest coast of Luzon, Philippines.

Helix concinna Sow., P. Z. S., 1841, p. 20.—DELESSERT, Recueil, t. 39, f. 2.—*Bulimus concinnus* PFR., Symb. iii, p. 53; Monogr. ii, p. 15; Conchyl. Cab. p. 180, t. 53, f. 4, 5.—DESH. in Fér. Hist. t. 145 A, f. 5, 6.—REEVE, Conch. Icon. t. 10, f. 52.—*Achatina concinna* PFR., *olim.*—*Cochlostyla concinna* SEMPER, Reisen. Phil. Archip. Landmoll. p. 206, t. 13, f. 11; t. 18, f. 18 (anatomy).—HIDALGO, Journ. de Conch. 1887, p. 169.

The columella of this species is like that of *Orthostylus leucophæa*, but the light texture, distinctly angular periphery and style of coloring cause me to consider it a *Hypselostyla.*

Var. FLAMMULA Semper. Pl. 11, fig. 29.

Imperforate, elongate-conic, solid; brown, elegantly ornamented with white flames. Spire elongated, apex obtuse. Whorls 6, nearly flat, the last subangulated at the base, encircled at the periphery with a black line. Columella straight, whitish; aperture trapezoidal, blue; peristome slightly thickened, narrowly reflexed and black-edged. (*Semp.*)

Alt. 44, diam 24; aperture, alt. 20, width 12 mill.

Palanan and Digollorin, E. coast of North Luzon; Satpat, in the Ilarön valley, on the west side of the northeastern cordillera.

C. flammula SEMP. Reis., Landmoll., p. 206, t. 9, f. 2.

I have not seen this form, but no characters except size separating it from *C. concinna* are mentioned by Semper.

C. ACUMINATA Sowerby. Pl. 10, fig. 7.

Imperforate, ovate-pyramidal, the apex a little obtuse; solid; chestnut banded with black, irregularly striated with brownish hydrophanous cuticle, bluish above, the apex pale. Whorls 6, rather flat, the last about equal to four-ninths the entire length. Columella straight, somewhat thickened in the middle, slightly twisted, white. Aperture oval, livid inside, subeffuse at the base; peristome simple, brown margined within, a little expanded. (*Pfr.*)

Alt. 36, diam. 20; aperture, alt. 18, width 10 mill.

Cuyo, Philippines.

Helix acuminata SOWB., P. Z. S., 1841, p. 39.—*Bulimus acuminatus* PFR., Symb. ii, p. 110; Monogr. ii, p. 14.—REEVE, Conch. Icon. t. 11, f. 60.

Compare *incompta* and *concinna*.

C. INCOMPTA Sowerby. Pl. 10, fig. 6.

Imperforate, ovate, rather thin, pale brown with two chestnut bands and covered with a thin brownish cuticle. Spire conoidal, obtuse. Whorls 5, slightly convex, the last scarcely shorter than the spire. Columella nearly straight, subdilated, the base somewhat truncated, surrounded by a chestnut area. Aperture widely lunate-oval; peristome simple, expanded, the basal margin forming an obtuse angle with the columella. (*Pfr.*)

Alt. 29, diam. 18; aperture, alt. 14, width 10 mill.

Tablas, Philippines.

Helix incompta SOWB., P. Z. S., 1840, p. 103.—*Bulimus incomptus* PFR., Symb. iii, p. 85; Monogr. ii, p. 15.—REEVE, Conch. Icon. t. 11, f. 53.

Seems to be allied to *C. concinna* and *C. acuminata*.

C. PYRAMIDALIS Sowerby. Pl. 9, figs. 61, 62.

Imperforate, oblong-pyramidal, somewhat thick; tawny, banded with dark chestnut, covered with a streaked deciduous brown cuticle. Spire elongated, apex obtuse. Whorls 5, a trifle convex, the last two-fifths the entire length. Columella somewhat twisted, subdilated, white. Aperture lunate-oval, livid within; peristome simple, narrowly expanded. (*Pfr.*)

Alt. 40, diam. 19; aperture, alt. 18, width 11 mill.

Island of Cuyo, Philippines.

Helix pyramidalis Sowb., P. Z. S., 1841, p. 39.—*Bulimus pyramidalis* Pfr., Symb. iii, p. 87; Monogr. ii, p. 36.—Reeve, Conch. Icon. t. 11, f. 59.—*Bul. nebulosus* Pfr., Symb. i, p. 42; Monogr. ii, p. 14.—Reeve, Conch. Icon. t. 11, f. 58*a*.

Fig. 61 is the *nebulosus* of Pfr.

C. fischeri Hidalgo. Pl. 10, fig. 15.

Ovate-oblong, thin, pellucid, smooth, corneous-brown; above closely variegated, below interruptedly bifasciate, with an opaque tawny-white cuticle. Spire conoid, apex obtuse. Suture simple; whorls 5, slightly convex, the last swollen, not descending in front. Aperture ovate, scarcely exceeding one-half the total altitude of the shell, brown inside; peristome narrowly expanded, bluish-white, the margins joined by a subindistinct callus, right margin regularly arcuate, columellar margin narrow, nearly vertical. (*Hid.*)

Alt. 35, diam. 21 mill.

Penon de Bintuan, Island of Busuanga, Philippines.

C. fischeri Hid., Journ. de Conchyl. 1889, p. 301, t. 14, f. 5.

* * *

New Guinea and New Ireland species having the contour of Hypselostyla.

The generic characters of the following three species, as well as of *C. papuensis* Hedley (Manual vol. vii, p. 190, pl. 58, fig. 97), remain to be discovered. For the present they may be conveniently grouped here, although the slender, acute apices of these southern forms do not accord well with the obtuse ones of the Philippine Island species.

C. translucida Quoy & Gaimard. Pl. 13, fig. 63.

Shell narrowly rimate, ovate-pyramidal; decussated with oblique and concentric striæ; rather thin, diaphanous, whitish. Spire pyramidal, apex acute; whorls 6, flat, the last a little shorter than the spire, angulated at base. Columella nearly straight, somewhat twisted to form a tooth in the middle. Aperture oblique, lunate-oval; peristome expanded all around, crenulated outside. Alt. 42, diam. 29; aperture, alt. 21, width 13 mill. (*Pfr.*)

Port Dorey, New Guinea.

Helix translucida Q. & G. Voy. de l'Astrolobe, Zool. ii, p. 103, t. 8, f. 11–13.—Desh. in Lmk. An. s. Vert. viii, p. 121.—Fer. &

DESH. Hist. t. 63 B, f. 5.—*Cochlostyla translucida* PFR. & CLESS., Nomencl. Hel. Viv. p. 209.—TAPPARONE CANEFRI, Ann. Mus. Civ. Genov. xix, p. 103.—*Bulimus quoyi* PFR., Monogr. ii, p. 16; viii, p. 10.

C. HINDEI Cox. Vol. vii, pl. 14, figs. 71, 72.

Shell rather thin, semi-translucent, pyramidally ovate, non-umbilicated; whorls six and a half to seven, the first ventricose, the second less so, the remainder almost flat in the centre but made to appear convex by being contracted towards the sutural junction; they are white and are covered with a thin membranous epidermis of a brownish-yellow or light chestnut color, which easily peels off by exposure, the epidermis in matured specimens is only present on the first three whorls, those beyond are nude, and from age and exposure are whitish-brown; the first three whorls are slantingly uniformly transversely striated with lines of growth, the striation showing through the membranous epidermis; the suture is impressed and is lined below on the lower two whorls by a narrow but very distinct dark band, which grows finer as it ascends and becomes lost about the middle of the third whorl; the striation appears worn off the upper 3 or 4 whorls. Columella arched, adnate, with a disposition only to be twisted, the lower end of the columella has a blunt tubercular plait which is whitish soiled-looking, this streak of almost white extends upwards as a narrow margin to the internal edge of the columella. The aperture is oval with a rather broad expanded reflected lip all round, the peristomal surface of which is dark brown, almost quite black; the interior of the aperture is of pale cream color; the dark band which borders the suture shows through the substance of the shell internally.

Length 40 mill.; breadth of last whorl 19 mill.; length of aperture 20 mill.; length of last whorl with aperture 22 mill.; from apex of shell to insertion of outer lip 14 mill. (*Cox.*)

New Ireland.

Cochlostyla hindei Cox, Proc. Linn. Soc. N. S. Wales (2), ii, p. 1063, March 21, 1888.

The following species is evidently closely allied to this, perhaps a synonym.

C. HEIMBURGI Brancsik. Pl. 13, figs. 58, 59.

Shell shining, delicately striated; greenish-testaceous, the apex more livid; sometimes the last whorl is ferruginous. Turrited-conic,

apex slightly obtuse. Whorls 6, the last slightly carinated in the middle and having a pitch-black line at the suture. Aperture oblique, oblong-oval; the outer lip thickened and reflexed, pitch-black. Umbilicus none. (*Brancsik.*)

Alt. 36, diam. 18; aperture, alt. 18, width 12 mill.

Matupit, New Britain.

Helix (*Geostrochus*) *heimburgi* BRANCSIK, Jahresheft des Naturwissenschaftlichen Vereines des Trencsiner Comitates, 1890–'91, p. 80, t. 7, f. 2a, b.

Probably the same as Dr. Cox's *C. hindei.*

Section XII. EUDOXUS Albers, 1850.

Eudoxus ALB., Die Hel. p. 137.—MARTENS, Die Hel. 2d edit., p. 179, type *B. effusus* Pfr.—SEMPER, Reisen im Archip. Phil., Landmoll. p. 213.

The shell is ovate or ovate conic, imperforate, smooth, shining, very light colored, generally thin and destitute of hydrophanous cuticle. Columella rather narrow, its face flattened.

This section is rather near in shell characters to *Phengus.* Anatomically, as far as known, *Eudoxus* presents no features not found in *Cochlostyla* generally.

C. EFFUSA Pfeiffer. Pl. 7, figs. 42, 43.

Imperforate, ovate, rather thin; very lightly striated, the earlier whorls minutely spirally striated. Covered with light buff cuticle, paler above, white under the cuticle.

Spire conoidal, apex obtuse; whorls 5, slightly convex. Aperture half the length of the shell, white within; peristome white, thin, *broadly expanded,* especially on the outer and basal margins. Columella vertical, narrow, flattened.

Alt. 40, diam. 30 mill.

Alt. 37, diam. 26 mill.

Tablas, Philippines.

Bulimus effusus PFR., P. Z. S., 1842, p. 152; Monogr. ii, p. 27.—REEVE, Conch. Icon. t. 12, f. 64.

The narrow, bevelled columella and the broadly expanding lip are characteristic. The unicolored form (fig. 42) was the original type of the species.

Color-var. *fasciata* (pl. 7, fig. 43). Like the type in form, but having chestnut-brown bands at suture and columella, and two on the median part of the body-whorl.

I cannot believe that the shell figured in Philippi's *Abbildungen*, Bul. pl. 6, fig. 8, is this species. The columella is entirely different in form.

C. HALICHLORA Semper. Vol. VII, pl. 27, figs. 4, 5.

Imperforate, *globose-turbinate*, thin but solid, of a *delicate light green tint*, becoming white on the spire. Surface shining, smooth, delicately obliquely striatulate and having some obsolete, microscope spiral lines. Spire elevated, apex obtuse, often tipped with orange; whorls 5, slowly increasing, the last rounded or obtusely angled at the periphery, scarcely descending in front. Aperture large, oblique, subrhombic, white within; peristome narrowly expanded, its edge often slightly tinged with rust-color; columella vertical, white, straight, its face flattened, deeply inserted.

Alt. 32, diam. 32 mill.

Alt. 31, diam. 33 mill.

Calayan; Babuyanes, North Luzon, Philippines.

Cochlostyla (*Corasia*) *halichlora* O. SEMPER, Journ. de Conchyl. 1866, p. 263, t. 8, f. 1.—SEMPER, Reis. Phil. iii, p. 172.

This *globose-turbinate*, light green-tinted shell is typically very distinct from other known species, but I have seen specimens intermediate between *halichlora* and *effusa*. Semper considered this species a *Corasia*, but it is undoubtedly an *Eudoxus*.

C. LEAI Pfeiffer. Pl. 17, figs. 33, 34.

Imperforate, ovate-conoid, rather thin, shining; light buff.

Spire conoidal, apex obtuse; whorls 5½, somewhat convex, the last obtusely subangulated in front. Aperture shorter than the spire, oblique, rounded-quadrate; peristome narrowly expanded, thickened within; columella distinctly flattened, steeply sloping.

Alt. 37½, diam. 26 mill.

Philippines.

B. leai PFR., P. Z. S., 1846, p. 29; Monogr. ii, p. 9.—REEVE, Conch. Icon. t. 12, f. 66.

The shell described above and represented in fig. 33 differs from Pfeiffer's description in being bluntly angled at the periphery. I believe, however, that it is the *C. leai*.

C. JONASI Pfeiffer. Pl. 8, figs. 53, 54, 56, 57; pl. 17, fig. 32; Vol. VII, pl. 37, figs. 43, 44.

Imperforate, ovate-conoid, rather solid, smooth, of a light yellow tint, which is either clear buff or verging toward green or tawny.

Sutural margin often paler; earlier whorls either pale or tinted with orange.

The spire is conical, apex very obtuse. Whorls about 5½, only slightly convex. Aperture oblique, white within or having the tint of the outside; peristome thickened and somewhat expanded, its face white; columella nearly straight, white, sometimes truncated at base.

Alt. 32, diam. 25 mill. (average specimen.)

Alt. 35, diam. 24 mill. (elevated specimen.)

Alt. 28, diam. 27 mill. (depressed specimen.)

Philippines.

Helix jonasi Pfr., P. Z. S., 1845, p. 126; Conchyl. Cab., p. 298, t. 50, f. 5, 6; Monogr. i, p. 225.—Reeve, Conch. Icon., t. 26, f. 113. —*H. albersi* Pfr., Zeitschr. f. Mal. 1849, p. 86; Monogr. iii, p. 300; iv, p. 362, etc.—*Helix buschi* Pfr., P. Z. S., 1845, p. 126; Monogr. i, p. 226.—Reeve, Conch. Icon., *Helix*, t. 203, f. 1430.—*H. perdita* Reeve, Conch. Icon., *Helix*, t. 25, f. 108.—*Bul. breviculus* Reeve, Conch. Icon., t. 12, f. 65.—? *B. leai* Pfr.

This species varies greatly in color and contour but the variations are so connected and inter-related that I am unable to demarcate the several described forms. Perhaps *C. leai* is another variety of this species, but I have identified quite another form as that species.

The original figures of *C. jonasi* are copied on pl. 37, figs. 43, 44 of the preceding volume of the Manual. The typical *C. buschi* is represented by figs. 53, 54, pl. 8. Reeve's *H. perdita* differs in no respect from this. On pl. 17, fig. 32, is represented an extreme form, being the most depressed specimen I have seen.

The tone of color varies from faint green, through buff to a pinkish flesh tint. The earlier whorls are often light orange colored.

C. simplex Jonas. Pl. 8, figs. 48, 49, 52.

Imperforate, ovate-conic, solid. *Green beneath, fading to white on the spire.* Surface delicately striated.

Spire conic, apex rather obtuse; whorls 5 to 5½, slightly convex. Aperture about half the length of the shell, oblique, the outer lip somewhat arching forward, narrowly expanded and thickened, white. Columella vertical, rounded, slightly truncated below.

Alt. 29, diam. 18 mill.

Alt. 25, diam. 17 mill.

Mindoro, Philippines.

B. simplex Jonas, Proc. Zool. Soc. 1842, p. 189.—Philippi, Abbild. i, p. 53, t. 1, f. 2.—Pfr., Monogr. ii, p. 11; Conchyl. Cab. p. 181, t. 53, f. 8.—Reeve, Conch. Icon. t. 12, f. 63.

Allied to *C. albersi*, but narrower and more conic.

C. quadrasi Hidalgo. Pl. 5, figs. 5, 6, 7.

Imperforate, ovate-conoid, solid, shining, smooth, (seen under a lens to be slightly and very minutely decussated by oblique and transverse striæ); white under a very thin green cuticle which is evanescent above, ornamented with pale or intense brown-purple bands, the base begirt with a black zone.

Spire conical, apex rather obtuse. Whorls 6, slightly convex, the last shorter than the spire; columella nearly straight, white; aperture oval, truncated above, white inside, showing the bands more or less; peristome little thickened, slightly expanded, roseate or brown-purple. (*Hid.*)

Alt. 26, diam. 14; aperture, alt. 12, width 8 mill.

Saban and Torrijos, Marinduque.

C. quadrasi Hid., Journ. de Conchyl. 1886, p. 154, t. 8, f. 3, 3a, 4; *l. c.* 1887, p. 177.

This species, says Hidalgo, is allied to *C. simplex* Jonas, but it is quite distinct in coloration and the less swollen form.

C. cossmanniana Crosse. Pl. 5, figs. 8, 9.

Imperforate, ovate-conoid, solid, somewhat shining, smooth (under a lens showing irregular suboblique growth lines and transverse, very delicate lirae). Whitish under a thin, shining, pale buff-green cuticle, obscurely banded with brown, green-black around the columella. Spire conic, apex slightly obtuse, white; suture impressed, pallid. Whorls 6, slightly convex, the last slightly shorter than the spire. Aperture ovate-angulate, brown-purple inside, white below the suture and at the edge; peristome somewhat thickened, slightly expanded, white; base marked with purple; margins separated, the columellar margin nearly straight, basal rounded, outer margin arched. Alt. 28, diam. 19 mill. (*Crosse.*)

Torrijos and Saban, Marinduque, Philippines.

C. cossmanniana Crosse, Journ. de Conchyl. 1886, p. 156, t. 8, f. 6.—Hidalgo, Journ. de Conchyl. 1887, p. 177.

Allied to *C. quadrasi*, but less slender, etc.

Var. *pallidior* Cr. (fig. 8). Whitish, the apex roseate, columella encircled with black.

C. MODESTA Sowerby. Pl. 17, figs. 28, 29, 30.

Imperforate, ovate-conoid, rather thin ; lightly striatulate, shining ; white, variously banded with brown or purple-brown, the more constant bands being one at periphery, one at the columella, and another, less constant, between them.

Spire conoidal, obtuse. Whorls 5. Aperture oblique, white and showing the bands inside, the latter not reaching to the lip; peristome slightly expanded, of a light reddish-brown color. Columella white. Alt. 25, diam. 20 mill.

Luzon, Philippines.

Helix modesta SOWB., P. Z. S., 1841, p. 39.—*Bulimus hindsi* PFR., Symbolæ, iii, p. 84, 1846.—(not *B. hindsi* REEVE, Conch. Icon.).—*B. verecundus* REEVE, Conch. Icon., t. 12, f. 62.

A peculiar little shell of a short form, very variable in color-pattern, but like no other species.

C. BELCHERI Pfeiffer. Pl. 8, figs. 45, 46.

Imperforate, ovate-oblong, solid, smooth ; *very light tawny, almost white above, darker tawny below;* having a *dark chestnut border below the suture,* a band at periphery and a *chestnut-black columellar tract.* Lip expanded, somewhat reflexed, *its face and reverse deep brown.*

Spire convex-conoidal, obtuse; whorls 5½. Aperture half the shell's length or somewhat less, ovate, white inside; peristome expanded, sometimes somewhat reflexed, dark brown. Columella subvertical, *white,* dilated in a thin spreading callus.

Alt. 37, diam. 24 mill.

Alt. 35, diam. 23 mill.

Philippines.

Bulimus belcheri PFR., P. Z. S., 1851, p. 261 ; Monogr. iii, p. 311 ; Conchyl. Cab. p. 110, t. 34, f. 5, 6.—*B. hindsi* REEVE, Conch. Icon. t. 7, f. 33, not *B. hindsi* Pfr.

Resembles narrow forms of *C. pictor* in the dark lip and in form, but differs entirely in the scheme of color, which is very similar to some patterns of *C. phæostyla.* The peripheral band is often only faintly sketched or even entirely absent.

C. LACERATA Semper. Pl. 13, fig. 57.

Imperforate, thin, [illegible], white, covered with a much lacerated buff cuticle. Whorls 5, convex, the last about equalling the acute spire in length. Columella flat, entering, white. Aperture lunate-oval; peristome thickened, reflexed.

Alt. 43, diam. 28; aperture, alt. 22, width 14 mill. (Semper.)

Valley of the River Saloc, Central Mindanao.

C. lacerata SEMP., Reisen, Landmoll., t. 9, f. 5.—*C. paradoxa* SEMPER, Ibid., p. 217; not *Cochlostyla* (*Chloræa*) *paradoxa* PFR.

Semper's earlier name must be retained on account of the paler *C. paradoxa* of Pfeiffer. The species is very distinct in having a network of yellow cuticle, over a white ground.

C. VIRGINEA Lea. Pl. 7, figs. 31, 32, 33, 34, 35, 36, 37, 39, 40.

Imperforate, ovate, thin, smooth and shining, white or of a *[illegible] blue-green tint*, darker beneath; *suture narrowly white-edged. Lip simple or very narrowly expanded; columella concave*, narrow.

The spire is variable in length; apex rather obtuse, the tip occasionally orange. Whorls about 5, slightly convex, the last a little descending in front. Aperture ovate, oblique; peristome usually almost simple or very narrowly reflexed. Columella arcuate, narrow, white.

Alt. 33, diam. 23, oblique alt. of aperture 18 mill.

Alt. 36, diam. 24, oblique alt. of aperture 21 mill.

Alt. 37, diam. 22, oblique alt. of aperture 19 mill.

Alt. 36, diam. 24, oblique alt. of aperture 22½ mill.

Mindoro; Luzon; Catanduanes, Philippines.

Bulinus bullula BROD., P. Z. S., 1840, p. 159 (read November 24, 1840).—*Bulimus bullula* PFR., Monogr. ii, p. 10; Conch. Cab. p. 179, t. 53, f. 2, 3.—PHIL., Abbild. i, *Bul.* t. 1, f. 1.—REEVE, Conch. Icon. t. 12, f. 68.—*Cochlostyla bullula* SEMPER, Reisen, p. 218.—HIDALGO, Journ. de Conchyl. 1887, p. 156; Obras Malacol. i, t. [illegible] 417, t. 3, f. 24.—*Bulimus virgineus* LEA, Proc. Amer. Philos. Soc. i, [illegible] distributed March 20, 1840); Trans. Amer. Philos. Soc. vii, p. 456, t. 11, f. 3.—*Cochlostyla chloroleuca* MARTENS, Mal. Bl. xv, p. 165, 1868.—SEMPER, Reis. Phil. Archip. p. 218.—*Bul. chloroleucus* PFR., Novit. Conch. iii, p. 466, t. 101, f. 20, 21.—*Cochlostyla bustoi* HIDALGO, Journ. de Conchyl. 1887, p. 157.

This species varies greatly in degree of elongation, but the extremes seem to be closely connected by intermediate variations. Figs. 39, 40, represent the *chloroleuca* Mts., a shell almost exactly like Lea's type of *virginea*.

Fig. 68, pl. 9 represents the form named BUSTOI by Hidalgo, and which is said by him to be a distinct species, distinguished by the more conoidal shell, spire having an additional whorl and tipped with reddish; last whorl more transverse, less high; aperture oblique, peristome more reflexed. These differences do not seem to be always associated, in the suite of 18 specimens before me. The *C. bustoi* is from *Catanduanes Is.*

In regard to the name adopted for this species, it must be said that Lea's description is fully as good as Broderip's, and has indisputable priority of publication. Broderip's description was not actually printed, I believe, until 1841. I have examined Lea's type specimen of *B. virgineus*. European conchologists do not seem to be aware of Lea's paper in the *Proceedings* of the Philosophical Society, as they quote the *Transactions* only.

C. HOLOLEUCA Pfeiffer. *Unfigured.*

Imperforate, conic-ovate, rather thin; striatulate, shining, subdiaphanous, white. Spire convex-conic, obtuse; suture narrowly margined; whorls 5, slightly convex, the last rather rounded; columella straightened, scarcely oblique, callous; aperture oblique, truncate-oval, concolored within; peristome narrowly expanded, the columellar margin dilated, adnate, forming a distinct angle with the basal margin. (*Pfr.*)

Alt. 32, diam. 23; aperture, alt. 15, width 12 mill.

Philippines.

B. hololeucus PFR., P. Z. S. 1855, p. 93; Monogr. iv, p. 359; vi, p. 7.

C. SMARAGDINA Reeve. Pl. 2, figs. 19, 20, 21, 22.

Imperforate, oblong-conoid, smooth and shining; solid; color varying from bright green to yellow, olive or brown, rarely banded; the earlier whorls either white or purple-brown; suture always having a white border below.

The spire is conoid, elevated, rather acute; whorls 5½ to 6. Aperture oblique, white or purplish within; peristome expanded and

reflexed, pure white or reddish, rarely purplish-black; columella vertical white.

Alt. 60, diam. 37 mill.

Alt. 52, diam. 33 mill.

Eastern Mindanao, Philippines.

Bul. smaragdinus Rv., P. Z. S., 1842, p. 49; Conch. Syst. ii, t. 173, f. 6; Conch. Icon., Bul., t. 6, f. 27.—Desh. in Fér., Hist., t. 110 B, f. 5.—Pfr., Conchyl. Cab., p. 207, t. 58, f. 5–7; Monogr. ii, p. 29.—*Cochlostyla* (*Eudoxus*) *smaragdina* Semper, Reisen im Archip. Phil., Landmoll., p. 213, t. 13, f. 19 (Anat.).—Hidalgo, Obras Malacol., t. 58.

Semper has found this species to be extremely variable. He recognizes varieties as follows:

1. Typical *smaragdina*, in which the shell is smooth and glossy, green or greenish-yellow, the spire either white or reddish.

2. Var. *nigrescens*. In this form the rose of the earlier whorls changes into dark reddish-brown; the emerald-green into black-green or even black-brown. In a few examples distinct darker and lighter spiral bands may be seen, and generally the base is darker than the upper portion. The specimen from Bislig shows a wide greenish-black band on the last whorl, between two narrower yellowish-brown-green ones; the columellar tract is dark greenish-black, and under the white sutural band there are a few alternately darker and light spiral striæ. The peristome is either white or reddish dark red-brown. Localities are Lianga, Tandag, Bislig, on the east coast, Suribao and Caguait in the valley of the Agusan.

3. Var. *lutea*. Unicolored ocher or straw-yellow, the spire white or reddish; showing upon the last whorl more or less developed traces of hydrophanous yellow cuticle; where this is absent the surface has the luster of the typical form, but when the cuticle is largely present the shell is dull, and these examples, which occur in the Agusan drainage, are usually smaller and compressed. The smallest measures, alt. 40, diam. 30, aperture 21 mill. long, 14 wide. The extremes are connected closely with the typical form. Some specimens have a violet-black lip, forming a transition to *C. ægle*. Localities are: Bislig, Higaquit, on the east coast of Mindanao; Dapa on Siargao (Sts. of Surigao); Mainit and S. Juan de Surigao, on the lower course, Agusan, Monte-Pasian and Monte-Kinuta, on the upper course of the Rio Agusan.

4. Var. *striata* (pl. 2, fig. 22). Close to the unicolored dark variety there is another which shows a multitude of yellowish or grayish striæ upon the dark brownish-black ground. There also occurs a form partly or wholly covered with a dull yellowish cuticle, so characteristic of the third variety. The measurements below are connected by intermediate examples.

Largest specimen, alt. 58, diam. 37 mill.; aperture, 29 x 18 mill.

Smallest specimen, alt. 39, diam. 29 mill.; aperture, 21 x 14 mill.

Jibon and Pasian, valley of the Rio Agusan.

5. Var. *zonifera* (pl. 2, fig. 21). Yellowish, banded at periphery, around columella and below the white sutural band with brown. Lip white, reddish or brown-black. Bislig, on the east coast; Monte Kinuta Pasian, Jibon, Mainit and Jabonga, in the Agusan valley.

C. STRAMINEA Semper. Pl. 17, fig. 31.

Imperforate, solid, but thin, dark straw-colored; striatulate; having a white band at the suture and a greenish-white columellar area. Spire short, conic, subacute. Whorls 5, convex, the last about equal in length to the spire. Columella vertical, pale corneous or black; aperture oblong-oval, whitish; peristome whitish, very thin, scarcely reflexed. (*Semper.*)

Large specimen, alt. 51, diam. 33; aperture, alt. 26, width 17 mill.

Small specimen, alt. 42, diam. 31; aperture, alt. 24, width 15 mill.

Lower valley of the Agusan R., and east coast of Mindanao.

C. straminea SEMP., Reis., p. 216, t. 8, f. 10. ("*C. ægle var.*" on expl. to plate viii).—HIDALGO, Journ. de Conch. 1887, p. 154.

Differs from *C. smaragdina* in wholly lacking the white sutural zone.

C. CUMINGI Pfeiffer. Pl. 9, fig. 63.

Imperforate, ovate, very thin, obliquely striated, pellucid, whitish-green, with a red line at the suture. Whorls 4½, slightly convex, the last obsoletely angulated, slightly longer than the spire. Columella flat, subexcavated, brown. Aperture lunate-oval; peristome simple, the right margin widely expanded, basal margin subreflexed. Alt. 32, diam. 21 mill. (*Pfr.*)

Camiguin de Mindanao.

Bul. cumingi PFR., P. Z. S., 1842, p. 88; Monogr. ii, p. 11; Conchyl. Cab. i, p. 66, *Bul.* t. 19, f. 3, 4.—PHIL., Abbild. i, *Bul.* t. 1, f.

7.—Reeve, Conch. Icon. t. 12, f. 61.—*Cochlostyla cumingi* Semper, Reisen, p. 217.—Hidalgo, Obras Malacol. i, t. 59, f. 1.

C. ægle Broderip. Pl. 1, fig. 12.

Imperforate, solid, rugose-striate, tawny with two darker bands. Spire short, conic, subacute. Whorls 5, somewhat convex, the last about as long as the spire. Columella vertical, straight. Aperture oblong-oval, reddish-white inside; peristome brown-black, expanded, slightly reflexed. (*Pfr.*)

Alt. 47, diam. 38; aperture, alt. 38, width 15 mill.

Mindanao.

Bulinus ægle Brod., P. Z. S., 1840, p. 181.—*Bulimus ægle* Pfr., Mon. ii, p. 27.—Reeve, Conch. Icon., t. 10, f. 49.—*Cochlostyla ægle* Semper, Reisen, p. 216.

This species is closely allied to the more solid, more opaque and larger *C. smaragdina.* Indeed, Semper seems disposed to unite *smaragdina, ægle, cumingi* and *straminea* as varieties of a single species. This union, although not unlikely, would be premature until their coalescence is proven.

Var. barandæ Hidalgo. Pl. 1, figs. 10, 11; pl. 9, figs. 69, 70.

Shell of a shorter, ovate form, the spire shorter and having more convex outlines than in typical *ægle.* White under a very thin buff cuticle, the lip and a columellar crescent dark brown; columella flesh colored, slightly concave.

Bul. ægle Pfr., Conchyl. Cab. t. 49, f. 17, 18.—*Cochlostyla barandæ* Hidalgo, Journ. de Conchyl. 1887, p. 153.

Several specimens before me, two of which are figured on pl. 9, figs. 69, 70, show a transition toward the true *C. ægle;* and I am therefore inclined to rank this as a variety.

C. oviformis Semper. Pl. 8, fig. 55.

Imperforate, egg-shaped, thin, subdiaphanous, shining; whorls 5, slightly convex, the last a little longer than the spire; suture subimpressed; columella twisted, subexcavated. Aperture quadrate-oval, white; peristome thin, reflexed, white.

Length 50, diam. 37; aperture, alt. 29, breadth 19 mill. (*Semper.*)

San Juan de Bislig, Mindanao.

C. oviformis Semp., Reisen im Archip. Phil., Landmoll., p. 218.

Only one specimen of this pure white and shining species is before me. Perhaps it is merely a very globose white variety of *C. smaragdina;* but in the absence of any transition-forms it seems necessary to indicate this as a new species. (*Semper.*)

C. UBER Pfeiffer. Pl. 7, fig. 44.

Imperforate, ovate, apex obtuse; thin, subdiaphanous, buff-whitish, obliquely, regularly and closely striated; spire semiglobose, suture impressed, white-margined; whorls 4, inflated, the last exceeding the spire; columella nearly straight, somewhat thickened at the base; aperture oval; peristome simple, widely expanded. Alt. 45, diam. 29, alt. of aperture 29, width 18 mill. (*Pfr.*)

Guimaras, Philippines.

Bulimus uber PFR., P. Z. S., 1842, p. 153; Monogr. ii, p. 26.—REEVE, Conch. Icon. t. 10, f. 48.

C. PHÆOSTYLA Pfeiffer. Pl. 5, fig. 4; pl. 9, figs. 64, 65, 66.

Imperforate, ovate, rather thin, shining, having indistinct growth-lines and fine spiral striæ; buff, olive-buff, or tawny-buff, generally having a dark chestnut band below the suture, another at the periphery, and a wide, dark columellar crescent. *Earlier* 1½ *whorls purple-black;* lip brown-edged.

The spire is convex-conic, apex rather obtuse. Whorls 5, slightly convex. Aperture ovate, half the length of the shell, white with a dark band inside. Lip thin, expanded and a trifle reflexed, brown-edged. Columella vertical, almost straight, its face narrow, bevelled, light brown, edged outside with white.

Alt. 33, diam. 22 mill.

Alt. 35, diam. 22 mill.

Philippines.

B. phæostylus PFR., Proc. Zool. Soc. 1856, p. 329; Monogr. ii, p. 361.—*Cochlostyla phæostyla* HIDALGO, Journ. de Conchyl. 1887, p. 155, t. 6, f. 5; Obras Molacol., t. 59, f. 7, 8.

The sutural band (fig 66), or the sutural and peripheral bands (fig. 64), are sometimes absent. The shell has somewhat the color-pattern of *C. belcheri,* but the purple apex, thinner texture, and especially the form of the narrow columella, which is not dilated or spreading, at once separate the two species. The columella of *phæostyla* is as in the typical species of *Eudoxus* (*C. effusa,* etc.), whilst that of *C. belcheri* has the form developed in *C. diana, calista, boholensis,* etc.

Section XIII. Phengus Albers, 1850.

Phengus Alb., Die Hel. p. 137, for *B. opalinus* and *B. evanescens.*—v. Martens, Die Hel. 2d edit., p. 180, type *H. opalina* Sowb.—Semper, Reisen im Archipel. Phil. Landmoll. p. 212.

Thin-shelled, pale green species, distinctly trochoidal in contour, having no hydrophanous cuticle.

Semper has restricted this section to the two species given below, and in my opinion correctly. The shells have the texture and color of *Eudoxus* but differ in being trochiform instead of oval or ovate.

Anatomically this section forms a connecting link with *Canistrum*. The globular accessory gland and the dart sac are becoming obsolete in *C. opalina*, being much reduced in size, the dart sac containing no dart.

C. opalina Sowerby. Pl. 8, figs. 50, 51.

Imperforate, pyramidal with flattened base and angular periphery; thin, somewhat translucent; of a delicate blue-green color, paler above, the suture having a very narrow white border below.

The spire is high with straight sides; apex obtuse; whorls 6 to 6½, *narrow, slowly widening.* Aperture very oblique; peristome very narrowly expanded, arched forward above. Columella rather wide, arcuate, white.

Alt. 30, diam. 21 mill.

Alt. 26, diam. 17 mill.

Province Cagayan, Luzon; Camiguin de Luzon, Philippines.

Helix opalina Sowb., P. Z. S., 1840, p. 98.—Pfr. in Conchyl. Cab. p. 291, t. 49, f. 6, 7; Monogr. i, p. 231.—Reeve, Conch. Icon. t. 23, f. 97.—*Cochlostyla opalina* Semp., Reisen Landmoll. p. 212, t. 13, f. 8 (anatomy).

This species is quite distinct in its high trochiform contour.

C. dumonti Pfeiffer. Pl. 9, fig. 67.

Imperforate, *trochoidal,* rather thin; color a very faint tint of green below becoming white on the spire, having a narrow sutural margin of red-brown or opaque white, and a peripheral dark line, or a narrow groove in its place.

The contour is much that of *Papuina*, being *flattened beneath, conoidal above, the periphery obtusely subangular.* The surface is lightly striated obliquely; spire conoidal, *apex very obtuse.* Whorls

5, convex. Aperture very oblique, white inside, not showing the band: peristome white or pink, well expanded, arched forward above. Columella white or pink, arcuate.

Alt. 29, diam. 21 mill.

Alt. 26½, diam. 21 mill.

Mindoro, Philippines.

Helix dumonti Pfr. in Phil., Abbild. ii, p. 84, *Helix*, t. 7, f. 6; Conchyl. Cab., p. 294, t. 49, f. 14, 15; Monogr. i, p. 229.—*Cochlostyla dumonti* Semper, Reisen, Landmoll., p. 213.

The dark peripheral line is inlaid in the surface of the shell, leaving a shallow groove when worn away. The lip in one specimen before me is of a delicate pink color.

Section XIV. Canistrum Mörch, 1852.

Canistrum Kl., Morch, Catal. Yoldi, p. 31 (for *B. luzonicus, ovoideus, stabilis*).—Martens in Alb., Die Hel., 2d. edit., p. 180 (type *C. luzonica* Sow.).—Semper, Reisen, p. 219.

Ovate-conic or oblong shells, imperforate and solid; banded; with or without hydrophanous cuticle; surface microscopically striated spirally. Whorls narrow. Lip well expanded, columella vertical.

Anatomically this section differs strikingly from all other Cochlostylas which have been investigated, in lacking all accessary glands upon the genitalia. A single species, *C. stabilis*, has been investigated, but it may be expected that the other forms of *Canistrum*, and probably *Prochilus* and *Chrysallis* also, will be found to share this peculiarity. Mörch was perfectly correct in including but three species in *Canistrum*; but all subsequent authors have enlarged the group by the addition of incongruous material.

C. ovoidea Bruguiere. Pl. 5, figs. 13, 16 (typical), 10, 11, 12, 14, 15 (varieties).

Imperforate, oblong-ovate, solid. *White, with a peripheral black-brown band*, which ascends the spire above the suture, becoming brown.

Spire convex-conical, apex obtuse; whorls 6, slightly convex. Aperture shorter than the spire, long-ovate, white and showing the

band inside; peristome well expanded, thick, white. Columella vertical, indistinctly or more or less obviously folded.

Alt. 33, diam. 19 mill.

Alt. 39, diam. 19 mill.

Alt. 33, diam. 20 mill.

Luzon, Ticao, Masbate, Philippines.

Bul. ovoideus Brug., Encycl. Méth. i, p. 335, 1792.—Sowb., Conch. Illustr. f. 53, 105.—*B. luzonicus* Sowb., P. Z. S., 1833, p. 73.—Reeve, Conch. Icon. f. 55.—*B. costerii* Eyd. in Guér. Mag. de Zool. t. 116, f. 2.—*B. euryzonus* Pfr., Zeitschr. f. Mal. 1847, p. 147.—Phil., Abbild. iii, t. 7, f. 10.—*Cochlostyla ovoidea* Semper, Reisen, p. 220.—Hidalgo, Journ de Conch. 1887, p. 179.

The typical *ovoidea* is represented in figures 13, 16. This is varied by the addition of a brown band covering the white of the body whorl except at suture and base (fig. 14); and from this to the form called *B. euryzonus* (figs. 10, 11, 12, 15) the transitions are abundant. In the typical *euryzonus* the body-whorl is encircled by three broad dark zones, the lower one sometimes extending to the columella; the cuticle is yellow, with a white subsutural line or band.

C. balanoidea Jonas. Pl. 6, figs. 17, 18, 19, 20.

Imperforate, oblong-conic, *solid. Ground-color yellowish, begirt with three dark chestnut zones, one bordering the suture, one above and the third below the periphery;* a small basal tract is *vivid green.* Hydrophanous cuticle thin, white, worn from the specimens before me except for a series of small patches along the subsutural dark band, and some whitish streaks behind the lip. The upper two bands ascend the spire.

Spire elevated, apex obtuse, whitish. Whorls 6½, slightly convex. Aperture shorter than the spire, oblique, white inside; peristome thick, broadly expanded, white edged with brown. Columella calloused, white, vertical and straight.

Alt. 43, diam. 25 mill.

Mindoro, Philippines.

B. balanoides Jonas, P. Z. S., 1842, p. 188.—Phil., Abbild. ii, *Bul.* t. 6, f. 2.—Reeve, t. 85, f. 630.—Pfr., Monogr. ii, p. 33.

This solid, oblong species has some resemblance to the trifasciate variety of *C. ovoidea*, but it differs in the thicker, brown-edged lip,

non-plicate columella, the green basal area, sutural dark border, etc.

C. STABILIS Sowerby. Pl. 6, figs. 25, 26, 27, 28.

Imperforate, ovate-conic, solid, compact. The color, in specimens which have been thoroughly wetted, or denuded of their hydrophanous cuticle, is *dark chestnut-brown with an indistinct black band at the periphery and a wide snow-white band under the suture;* spire white with a brown band above the suture (figs. 27, 28). In fresh specimens this coloring is *totally concealed by a dense coat of cream-white hydrophanous cuticle, having a narrow black line at the periphery and a wider one on the base; the peripheral line extending up the spire above the sutures, becoming brown there.*

Spire elevated, apex obtuse. Whorls 6½, slightly convex, narrow. Aperture oval-truncate, nearly white within, and showing faintly the peripheral band; lip well expanded, white. Columella subvertical, white.

Alt. 32, diam. 20 mill.

Alt. 26, diam. 19 mill.

Southern Burias, Philippines.

Helix stabilis SOWERBY, P. Z. S., 1840, p. 104.—*Bul. stabilis* PFR., Symbolæ ii, p. 51; Monogr. ii, p. 34; Conchyl. Cab., p. 172, t. 51, f. 6.—PHIL., Abbild., iii, t. 7, f. 4.—REEVE, Conch. Icon., t. 12, f. 67. —*Cochlostyla stabilis* SEMPER, Reisen im Archip. Phil., Landmoll., p. 219, t. 13, f. 7; t. 18, f. 5 (anatomy.)

This is a very solid, high-trochiform species. The young are carinated, and the keel generally persists on the front of the body-whorl. The coloring changes completely when the hydrophanous cuticle is removed. The species is extremely constant in color-pattern. Under a strong lens the whole surface is seen to be finely striated spirally.

C. BREVICULA Pfeiffer. Vol. VII, pl. 47, fig. 64.

Imperforate, subovate, the apex obtuse; obliquely obsoletely striated; shining, white, covered with a buff epidermis. Whorls 6, narrow, slightly convex, the last about one-third the total length. Columella nearly straight, expanded in a thin plate. Aperture very oblique, transversely semioval; peristome simple, expanded. (*Pfr.*). Alt. 28, diam. 18; aperture alt., inside, 13, width 9 mill.

Romblon, Philippines.

B. breviculus Pfr., P. Z. S., 1842, p. 88; Symb. ii, p. 43; Monogr. ii, p. 35.—Phil., Abbild. iii, p. 33, t. 7, f. 8.—? ? *B. breviculus* Reeve, Conch. Icon. t. 12, f. 65.

Nearly allied to *C. stabilis*, but readily separated by its short compressed contour, more convex whorls and the broad semi-ovate aperture. All examples which I have seen are unicolored white or with a narrow brown crescent around the columella, and having an evanescent yellowish epidermis over the rest. The columella is vertical, dilated in a thin reflexed lamina; the lip simple, pretty broadly expanding. (*Pfr.*)

Reeve's figure probably does not represent this species.

Section XV. Prochilus Albers, 1860.

Prochilus Albers in Marten's edit. of Die Heliceen, p. 179, type *C. virgata.*

Shell narrowly perforated, ovate-pyramidal, smooth and shining: the spire long. Aperture small, less than half the length of the shell; peristome very broadly reflexed. The soft parts of these strikingly handsome shells are still unknown, but the affinities of the group seem to be with *Canistrum* and *Chrysallis.* They live on trees, like other conspicuously colored Cochlostylas.

C. calobapta Jonas. Pl. 15, figs. 7, 8, 9.

Perforate, ovate-pyramidal, *thin;* the *spire high and slender. Cream colored or tawny brown, bandless or encircled by a dark zone at periphery and another at umbilicus, the former ascending the spire, forming a narrow edge above the suture;* varied with *conspicuous oblique stripes of cream-white hydrophanous cuticle.*

The spire is slender, high; apex obtuse. Whorls 5½, *convex.* Aperture oblique, showing the band within: peristome thin, broadly expanded, white; its reverse having the same color as the general surface of the shell. Columella reflexed, the reflexed edge curving backward, or partly around the umbilicus, at its junction with the base. Alt. 40, diam. 20 mill.

Mindoro, Philippines.

B. calobaptus Jonas, P. Z. S., 1842, p. 188.—Phil., Abbild. i, t. 1, f. 6.—Pfr. in Conchyl. Cab. p. 116, t. 35, f. 11–14; Monogr. ii, p. 42.—*Cochlostyla calobapta* Semp., Reis. p. 221.—*Bul. cuyoensis* Reeve, Conch. Icon. t. 9, f. 43.

This is a decidedly thin shell, and although the whorls are convex, the general outlines of the spire are somewhat concave. The length of the aperture is contained about 2⅓ times in the entire length of the shell.

C. CUYOËNSIS Pfeiffer. *Unfigured.*

Subperforate, ovate-pyramidal, rather glabrous, somewhat shining, of a cinnamon-tawny color with flexuous pale streaks and one reddish band. Suture lightly impressed; whorls 5½, *nearly flat*, the last *scarcely exceeding one-third the total length.* Columella short, thickened widely reflexed. Aperture oval; peristome thin, little expanded.

Alt. 30, diam. 15; aperture, alt. 13, width 8 mill.

Island of Cuyo, Philippines, very rare.

B. cuyoënsis PFR., P. Z. S., 1842, p. 152; Monogr. ii, p. 43.

From the very closely allied *C. calobapta* this differs in the solid shell, less convex whorls and less dilated peristome. (*Pfr.*)

C. FICTILIS Broderip. Pl. 16, figs. 16, 17.

Narrowly perforate, fusiform-pyramidal, solid. *Cream-white, with longitudinal stripes of dark brown*, these streaks often broken into angular spots, sometimes zigzag or branching.

Spire high, apex obtuse; whorls 6, almost flat. Aperture contained about 2⅓ times in the entire length, oblique; peristome very broadly and roundly expanded and reflexed, its face pure white, *vererse cream-white; basal lip receding.* Columella roundly reflexed, strongly calloused above where it joins the base of the shell.

Alt. 34, diam. 15 mill.

Cuyo, Philippines.

Bulinus fictilis BROD., P. Z. S., 1840, p. 96; Conch. Illustr. f. 115, 116.—*Bulimus fictilis* REEVE, Conch. Syst. ii, t. 173, f. 1; Conch. Icon. t. 9, f. 44.—PHIL., Abbild. i, p. 54, *Bul.* t. 1, f. 5.—PFR, Monogr. ii, p. 53; Conchyl. Cab. p. 211, t. 59, f. 10, 11.—*Bulinus larvatus* BROD., P. Z. S., 1840, p. 96; Conch. Illustr. f. 117.

This form is well differentiated from the group of *virgata-dryaspartuloides*, being slenderer in contour, and totally different in color-pattern.

Var. LARVATA Brod. Pl. 15, fig. 10.

Shell more elongated, coloring of the external surface continued upon the reverse of the lip, forming a colored rim on the lower external edge.

Island of Cuyo.

C. VIRGATA Jay. Pl. 16, figs. 11, 12, 13, 14, 15; pl. 17, fig. 35.

Narrowly perforated, turrited, solid; the spire slender. *Ground-color yellow*, usually having two or three broad brown zones, and frequently variegated with oblique stripes of cream-colored hydrophanous cuticle. Whorls 5½, rather convex; aperture *almost half as long as the shell*, oblique; peristome very broadly expanded and reflexed; columella roundly reflexed; parietal wall having a thin, *transparent* callus. Alt. 50, diam. 25 mill.

Mindoro, Philippines.

Bulimus virgatus JAY, Catal. 1839, p. 120, t. 6, f. 4.—REEVE, Conch. Icon., t. 9, f. 46.—PFR., Monogr. ii, p. 40.—SOWB., Conch. Illustr., f. 112–114.—*Cochlostyla virgata* and *C. porracea* HIDALGO, Journ. de Conchyl. 1887, p. 181.—*Bul. sylvanus* BROD., P. Z. S., 1840, p. 95.—*Partula labrella* GRAT., Actes Soc. Linn. Brod., xi, p. 423, t. 4, f. 6.—*B. porraceus* JAY, Catal., p. 120, t. 6, f. 5.—*Cochlostyla sylvanoides* SEMPER, Reisen im Archip. Phil. Landmoll., p. 222, t. 10, f. 4.

The principal characters distinguishing this species from *C. [illegible]*, are the longer aperture, the thinner parieto-columellar callus, the more convex whorls and slenderer spire, and finally the darker ground-color, which is always yellow.

The following color-varieties are connected by intermediate forms.

The typical coloring (shown in fig. 35 of plate 17) is as follows: Ground color light yellow; two broad brown zones upon the body whorl continuing upon the reverse of the lip; apical whorls white; hydrophanous stripes present but sometimes evanescent; lip not black-edged.

Color variety *porracea* (pl. 17, fig. 36) is of a clear yellow or yellow-green color, with or without stripes of opaque hydrophanous cuticle on the earlier whorls; lip entirely pure white, its reverse clear yellow; apical whorls white.

Color variety *sylvanoides* Semper (pl. 17 fig. 37; pl. 16, fig. 11) is clear yellow or with white sutural and peripheral bands. The earlier whorls are white; the peristome is edged with black-brown.

its reverse being of the same color. Semper described this from a specimen denuded of cuticle. It is between the preceding and the following in characters.

Color variety *pulchrior* (pl. 16, figs. 12, 13). Ground color yellow, having two or three wide dark zones; striped with hydrophanous cuticle. Earlier whorls dark purple; lip edged with black, its reverse black-brown. This is the most conspicuous and handsome form.

C. DRYAS Broderip. Pl. 16, figs. 18, 19, 25.

Almost covered but perforated, solid, pyramidal, the spire conically elevated, its *lateral outlines straight.* Whorls 6½ to 7, nearly flat. Aperture decidedly less than half the length of the shell, oblique; peristome very broadly reflexed, strongly rolled backward or *recurved at the edge.* Reverse of the lip light colored, the *dark bands*, when present, *not continuing upon it.* Ground-color white or whitish buff, unicolored or having dark bands below suture, around umbilicus and often at the periphery.

Spire straightly conical. Aperture small, the peristome very broad, its face convex, white, never dark-edged. Columella very heavily calloused above; parietal callus rather thick at the edge.

Alt. 52, diam. 25 mill.

Alt. 48, diam. 21 mill.

Mindoro, Philippines.

Bulimus dryas BROD., P. Z. S., 1840, p. 94.—*Bulimus dryas* PFR., Monogr. ii, p. 41.—REEVE, Conch. Icon., f. 45.—*Bulimus paradoxus* PFR. in Phil., Abbild. ii, p. 155, t. 6, f. 6.—*B. porraceus* SOWB., Conch. Illustr., f. 108–111, not of Jay.

A solider, more straightly conical species than *C. virgata*, generally having a whorl more, a thicker columellar callus and a lighter ground color, as well as a different color-pattern. Notwithstanding all of these differences there are individuals which it is extremely difficult to satisfactorily name. The principal color patterns are the following:

1. Unicolored white or faint buff (fig. 25).

2. Unicolored white or faint buff, with a dark chestnut band at or near the suture, and another at the columella (fig. 19).

3. The same, but having a broad or narrow brown band at the periphery (fig. 18).

A specimen before me is chestnut-brown, with light apex, white sutural line and darker subsutural and umbilical bands.

C. PARTULOIDES Broderip. Pl. 16, figs. 20, 21, 22, 23, 24.

Narrowly perforate, ovate-pyramidal, the spire straight-sided. Whorls nearly 6, slightly convex. Aperture ovate, somewhat oblique; peristome broadly, flatly expanded, white, its reverse white. Columella wide, reflexed, distinctly truncated at the base. Color yellowish, banded with black-brown, or dark chestnut with a white sutural band. Alt. 34, diam. 18 mill.

Tablas and Mindoro, Philippines.

Bulinus partuloides BROD., P. Z. S., 1840, p. 181.—*Bulimus partuloides* REEVE, Conch. Icon. t. 11, f. 54.—PFR., Monogr. ii, p. 42.

I am in doubt whether this is more than a variety of *C. dryas*, although the more typical forms, such as are represented in figures 23, 24, are readily distinguishable by their small size, abruptly truncated columella, etc.

C. NIGROCINCTA Semper. Pl. 13, fig. 62.

Perforate, conic-ovate, solid, smooth, shining, white, ornamented with black-chestnut bands. Spire conical, tawny above, the apex obtuse. Whorls 5½, nearly flat, the last a little shorter than the spire, carinated in the middle, the keel disappearing anteriorly; base rounded. Aperture subvertical, truncate-oval; peristome thin, right margin sinuated above, then rather widely spreading; columellar margin straightly ascending, vaultingly reflexed. (*Pfr.*)

Alt. 30, mill. 16; aperture with peristome, alt. 15, width 12 mill.

Philippines.

Bulimus pan PFR., P. Z. S., 1861, p. 23, t. 3, f. 5; Novit. Conch. p. 163, t. 44, f. 6, 7; Monogr. vi, p. 29 (not *Helix pan* BROD. 1841, also a *Cochlostyla*).—*Cochlostyla nigrocincta* SEMPER, Reisen, p. 221.

C. MERCURIUS Pfeiffer. Pl. 10, figs. 12, 13.

Perforated, ovate-conic, solid, shining (minutely decussated under a lens), tawny-white, ornamented with wide chestnut bands; spire turrited-conic, rather acute. Whorls 6½, a trifle convex, the last about three sevenths the entire length; base rounded; columella substraightened. Aperture little oblique, truncate-oval; peristome simple, narrowly expanded, the columellar margin vaultingly reflexed. (*Pfr.*)

Alt. 36, diam. 18; aperture alt. 16, width (inside) 9 mill.

Habitat unknown.

Bulimus mercurius Pfr., P. Z. S., 1852, p. 59; Monogr. iii, p. 340; Conchyl. Cab. p. 113, t. 35, f. 3, 4.

Perhaps not a *Cochlostyla*, but without examining the type I am unable to refer it to any other group.

Section XVI. Chrysallis Albers, 1850.

Chrysallis Alb., Die Hel., p. 140 (part).—v. Martens in Die Hel. (2), p. 179, 1860, type *C. chrysalidiformis* Sow.

Shell perforated, elongated ovate-conic, solid, opaque, not smooth; the aperture ovate, less than half the length of the shell; lip broadly expanded; columellar margin dilated and reflexed. Hydrophanous cuticle generally present.

Anatomy unknown.

These shells resemble *Prochilus* in general contour and in having the columella or axis of the shell actually *perforated*—a character in which they differ from all other sections of *Cochlostyla* except certain forms of *Corasia*. The species of *Chrysallis* differ from *Prochilus* in having the columella strongly folded above but not truncated below; in the rougher surface, dull coloring and the possession of hydrophanous cuticle.

The three known species of *Chrysallis* inhabit the island Mindoro. They may be distinguished as follows:

A. Parietal callus and columella porcelain-white, edged with dark brown *electrica.*

B. Parietal wall not pure white

- *a.* Body whorl well rounded; aperture nearly half the length of shell *mindoroensis.*
- *b.* Body whorl laterally compressed; aperture decidedly less than half the length of shell *chrysalidiformis.*

C. chrysalidiformis Sowerby. Pl. 14, figs. 64, 65, 66, 67.

Shell having a distinct crevice behind the columellar lip, but not perforated; of an oblong-ovate or cylindrical form; solid. Typically straw-colored, with a brown sutural band spotted with white and a brown peristome, but often clear buff with white lip, or tawny-chestnut, conspicuously streaked with longitudinal white or yellow stripes. Surface rather coarsely and irregularly wrinkled by growth striæ.

The spire is long, with slightly convex outlines and blunt apex; whorls 7 or 7½, nearly flat, the last laterally compressed. Aperture small, much less than half as long as the shell; lip thin, very broadly expanded; columellar lip dilated; parietal callus thin.

Alt. 70, diam. 30 mill.

Alt. 65, diam. 30 mill.

Alt. 75, diam. 26 mill.

Mindoro, Philippines.

Bulinus chrysalidiformis Sowb., P. Z. S., 1833, p. 37; Conch. Illustr., f. 28.—Brod., P. Z. S., 1840, p. 86.—*Bulimus chrysalidiformis* Pfr., Monogr. ii, p. 76; Conchyl. Cab., p. 201, t. 57, f. 1–3.—Reeve, Conch. Icon., t. 4, f. 16.—Dh. in Fér., Hist., t. 149, f. 3–6, 10, 11.—*Bulimus ustulatus* Jay, Catal., p. 19, t. 6, f. 1, 1839.—*B. aspersus* Grat., Soc. Linn. Bord. xi, p. 421 (in part).—*C. antonii* Semper, Reisen, p. 223.

The laterally-compressed body-whorl, the small aperture, produced at the base of the columella, and the more closed umbilicus, are prominent characters separating this species from its allies.

The typical form (pl. 14, fig. 64) of Sowerby's original description has a pale straw-colored cuticle ornamented with a chestnut sutural band which is spotted with hydrophanous light patches; the lip and columella are dark brown. A variation of this is shown in fig. 65, representing a yellow form with white lip.

Color-var. *ustulata* Jay (figs. 66, 67) has a dark chestnut or red-chestnut ground-color fading on the spire, and it is striped with broad hydrophanous creamy or yellowish longitudinal bands.

Some specimens of this form are greatly elongated (fig. 67). The outer lip usually shows a slight projection at the middle of its face, produced by a short groove or furrow upon its reverse.

Variety *antonii* Semper. Shell broader, uniform yellow with white sutural spots; lip white or roseate, very broadly expanded subreflexed.

Alt. 67, diam. 42 mill.; aperture, alt. 28, width 16 mill.

C. mindoroensis Broderip. Pl. 14, figs. 68, 69, 70, 71; pl. 15, figs. 1, 2.

Umbilicate, conic-elongated-ovate, solid, the surface nearly lusterless, somewhat wrinkled by oblique growth-striæ. Color dark purple-brown (rarely light yellowish-brown) streaked longitudinally with yellow or cream-white stripes, which are sometimes rather wide

and irregular (fig. 70), sometimes narrow, close and parallel (figs. 71, 1, 2.)

The spire is elevated, and either paler or darker than the body-whorl. Apex obtuse, white or purple. Whorls 5½ to 6½, slightly convex, the last whorl convex. Aperture ovate, somewhat less than half the entire length of the shell, white inside; lip broadly expanded and reflexed, dark purple-brown (rarely light flesh-brown). Columella widely dilated, folded, its reflexed edge dark brown. Parietal wall covered with a thin transparent callus, showing the colors of the external surface.

Alt. 64, diam. 31 mill.
Alt. 48, diam. 26 mill.
Alt. 67, diam. 35 mill.

Mindoro, Philippines.

Bulimus mindoroensis Brod., Proc. Zool. Soc. Lond., 1840, p. 84. —*Bulimus mindoroensis* Pfr., Monogr. ii, p. 76; Conchyl. Cab., p. 202, t. 57, f. 4, 5.—Reeve, Conch. Syst. ii, t. 173, f. 5; Conch. Icon. t. 4, f. 15.—*Bul. wagneri* Grat., Actes Soc. Linn. Bord. ix, p. 164 (teste Pfr.).—*Bul. aspersus* Grat., Ibid., p. 421, t. 2, f. 8.—*Bul. melanogaster* Morch, Catal. Yoldi, p. 30.

This species is allied in color pattern to *C. chrysalidiformis* var. *ustulata*, but may readily be distinguished by its less wrinkled surface, larger and wider aperture, less elongated, more rounded body-whorl, etc. It differs from *C. electrica* in having the parietal wall colored like the exterior of the shell.

Occasional specimens possess a dark peripheral girdle bordered above with a light band (fig. 70). The *B. aspersus* of Grateloup (pl. 14, fig. 69) has no differential characters.

C. electrica Reeve. Pl. 15, figs. 3, 4, 5, 6.

Perforate, ovate-turrited, rather solid. Surface nearly smooth, somewhat wrinkled by growth-lines and having subobsolete fine spiral striæ. Ground-color dark chestnut, covered with a thin but even coat of brown cuticle, which is more or less variegated by narrow lightning streaks of cream-white accompanied by dark streaks; periphery begirt with a dark girdle (rarely obsolete); umbilical tract dark also, denuded of hydrophanous cuticle.

Spire conical, apex obtuse; whorls 6, slightly convex, the last whorl convex. Aperture half the total length of the shell or somewhat less, white inside; lip broadly and flatly expanded, dark

brown. Columella broad, distinctly folded; *parietal wall and columella covered with a heavy deposit of pure white callus, the reflexed edge of the columella and a band at the edge of the parietal callus dark brown.* Alt. 59, diam. 31 mill.

Mindoro, Philippines.

Bulimus electricus REEVE, Conch. Icon., t. v, f. 21 (April, 1848). —PFR., Monogr. iii, p. 326.—*Bul. lichenifer* MORCH, Catal. Conch. Kierulf, p. 29, t. 1, f. 3 (October, 1850).—*Bul. caillaudi* PETIT. Journ. de Conchyl. 1850, p. 414, t. 13, f. 3.

This species is allied in form to *C. mindoroensis*, but it differs in having the columella and parietal wall covered with an opaque porcelain-white callus edged with a brown band. The external coloration of the shell, also, is different.

There can be no reasonable doubt that the three forms included in the above synonymy are specifically identical. Fig. 4 is Reeve's original *electrica*; fig. 5 is the *lichenifer* of Mörch; fig. 3 is drawn from a specimen before me.

Color-var. *caillaudi* Petit (fig. 6) is a pale yellow individual or perhaps a pale race, holding the same relation to the dark forms that the typical *C. chrysalidiformis* holds to the var. *ustulata* Jay.

SUPPLEMENT TO HELIX.

The following pages contain descriptions of species which have been made known since the publication of the various parts of this work treating of the genus *Helix*, and also of certain species omitted in the body of the work.

Genus SAGDA (Vol. III, p. 5).

From this group must be removed the species *circumfirmata* Redf. and *discrepans* Pfr. (p. 9), of Bermuda. These belong to POECILOZONITES, a genus of *Zonitidæ* (Vid. Proc. Acad. Nat. Sci. of Phila. 1888, p. 285).

Genus LEUCOCHROA (Vol. III, p. 10).

KOBELT, in his continuation of Rossmässler's *Iconographie* (new series, vol. iii, p. 29–43, 1887), has discussed this group with his accustomed acumen, and has illustrated a large series of specific and varietal forms. He seems to consider *H. thayaca* and *H. titanodolena* of Bourg. as mere varieties of *H. otthiana*, but SPIRONOMALA (pl. 21, figs. 10, 11) he thinks is a well-defined and distinct species.

L. CANDIDISSIMA *var.* SARDOA Maltzan.

Illustrations of this Sardinian species or variety are given by Kobelt; the form has been referred to *bætica* by some, to *rimosa* Christ. and Jan by other authors. It is probably a local variety or sub-species of *candidissima*.

L. OCTINELLA Bourguignat. Pl. 21, figs. 7, 8, 9.

See Manual iii, p. 13. The figures here given are from Kobelt. This form differs from *cariosula* in the much stronger keel, and the rougher sculpture, but intermediate specimens will probably be found.

St. Denis au Sig S.–E. of Oran.

L. DEBEAUXI Kobelt. Pl. 21, figs. 4, 5, 6.

The sculpture consists above of close, irregular wrinkles, which are coarser and more uneven than in *octinella* and *Kobeltiana*; the whorls are shouldered, the last whorl becoming rounded toward the aperture, by the obsolescence of the keel. This seems to be a species distinct from *Kobelti* and *mayrani*.

Near Nemours, and Lella Marnia, Algier.

L. HISPANICA Westerlund. Pl. 21, figs. 1, 2, 3.

Shell depressed-globuloid, covered umbilicate or with the umbilicus wholly closed, solid, chalky, gray-white, not shining, more or less wrinkle-striate, the apex smooth, shining, submamillar, whorls 5, the upper slightly convex, separated by a crenulated suture, regularly and slowly increasing; last whorl slightly dilated, angulated at the periphery, the angle often becoming obsolete toward the aperture; arcuately deflexed in front, beneath convex, flat around the umbilicus, into which it passes by a right angle. Aperture small, semi-ovate subangulate outside; peristome lightly thickened, margins joined by a thin callus, the upper margin much produced, outer slightly reflexed, basal more or less dilated above the umbilicus. Alt. 14, greater diam. 18, lesser 16 mill. (*Kob.*)

Almeria and Malaga, southern Spain.

H. cariosula ROSSM., Icon. iii, p. 17, not Mich.—*L. hispanica* WESTERL., Fauna Palæarct. Binnenconch. i, p. 87.—KOBELT, contin. of Rossm. Icon. n. f., iii, p. 39, f. 448, 449.

L. SAHARICA Debeaux. Pl. 21, figs. 15, 16, 17.

Shell subglobose conoidal, exumbilicate, angulate, scarcely shining, chalky, white or slightly buff; irregularly striated; spine conoid, apex rather obtuse, smooth, white; suture profoundly impressed, very slightly crenulated, whorls 5½ slightly convex, regularly widening, angulated above the suture; last whorl slightly dilated, distinctly angulated in the middle but hardly carinated, deflexed in front, base convex. Aperture ovate, lunate, oblique; peristome thickened in adults, the outer and lower margins a little reflexed; margins parallel, insertions distant, joined by a callus; columellar very little excavated, dilated at the insertion entirely closing the umbilicus. Alt. 15, greater diam. 20½, lesser 18 mill. (*Kob.*)

Oases of the desert border, southern Oran.

L. saharica (Deb. in sched.) KOBELT, Nachr. Bl. 1887, p. 124; Iconogr. iii, p. 36, f. 439, 440.

This seems to be a species peculiar to the Southern Oran desert border, occurring with the two-toothed Macularias. The peculiar suture, the slow increase of the whorls and the lusterless upper surface remind one of the group of H. *cariosula*, and sunder this form from the keeled varieties of *H. candidissima*.

L. ISSERICA Kobelt. Pl. 21, figs. 12, 13, 14.

Shell depressed trochoidal umbilicate, or having the umbilicus more or less covered, or entirely so; periphery angulate, base a little convex. Solid, chalky, striatulate, rather shining, white or yellowish-white. Spire conoid, the apex peculiarly exserted. Whorls 6, those of the apex convex, the following flat, lightly impressed above the suture, forming a keel, which the impressed, slightly crenulated suture follows; last whorl inflated but scarcely dilated, angulate-carinated, convex above and below: no umbilical angle; at the aperture the whorl descends suddenly and deeply. Aperture very oblique, ovate-angulate, moderately lunate, margins somewhat approaching, joined by a very thin callus; upper margin straight, produced, acute, forming an angle with the scarcely reflexed outer lip, basal lip thickened, a little reflexed, dilated over the umbilicus at the insertion. Alt. 15–18, diam. greater 21½–24, lesser 18½–21 mill. (*Kob.*)

Tizi R'rir, at the passage of the oriental Isser, below Palestro.

Leucochroa isserica Kob., Icon. Land u. Süsswasser-Moll. (n. f.), iii, p. 33, f. 429–432, 1887.

This form lies between the groups of *candidissima* and *otthiana*. It cannot be united with the former on account of the form of the apex. It differs from *spiranomala* in lacking an umbilical angle, and in having the whorls much less closely united at the sutures; it differs from *thayaca* and *titanodolena* in having the whorl much more deeply deflexed at the aperture. The species is probably confined to the basin of the Isser, and seems to be widely distributed therein.

Unfigured Leucochroæ.

L. ADANENSIS Naegele, Nachr.-Bl. D. M. Ges. 1890, p. 140. Adana, Cilicia, Syria. Resembles *fimbriata* Bgt., but is more depressed, the umbilicus is constant though more or less covered; the keel is not crenulated, and the size is larger—alt. 8–10, diam. 16–18 mill.

Genus LAOMA (vol. III, p. 68, + *Phrixgnathus*, III, p. 37).

Laoma (Gray) Pils., Nautilus, Sept. 5, 1892, p. 55.

L. MARINA Hutton. Pl. 23, figs. 17–20.

Shell small, trochiform, carinated, narrowly perforated; thin; subtranslucent, corneous, closely striped with reddish undulating or

zigzag streaks, radiating on the base, oblique above; the cord-like keel alternately white and reddish. Surface obliquely regularly striated; shining with a golden luster.

Spire conic, with slightly convex slopes; apex slightly obtuse. Whorls 6, flat, the carina projecting cord-like along the sutures; last whorl somewhat concave above and below the peripheral keel; base convex.

Aperture somewhat oblique, rhombic; columella thickened within and bearing a strong spiral fold; parietal wall bearing one or two strong entering folds, outer lip having one fold above the periphery and from one to three upon the base. Lip sharp, dark-edged; simple except at the columella, where it is expanded.

Alt. 2·3, diam. 3·5 mill.

North Island of New Zealand at Forty-mile Bush, Mt. Wellington and Remuera, near Auckland.

Endodonta marina HUTTON, Trans. N. Z. Inst. xvi, p. 196.—*Laoma marina* SUTER, *l. c.* xxiv, p. 283, 298, t. 23, f. 41, 42 (jaw and dentition).—*E. nerissa* HUTTON, op. cit., p. 196; *cf.* Suter, op. cit. p. 283.

Suter has shown that the number of teeth developed varies from three to seven, Hutton's *L. nerissa* being founded upon specimens with the last number (fig. 18.)

This species has the contour and coloring of *L. pœcilosticta* Pfr., but in the teeth it resembles *L. leimonias.*

L. CONELLA Pfr. Pl. 23, fig. 16.

Shell very narrowly perforated, depressed-turbinate, distinctly angled at the circumference, about equally convex above and below the keel; thin, somewhat translucent, horny with close irregular stripes of tawny-brown, which radiate below, and descend obliquely forward above. Surface smooth, having a dull silky luster but not shining; growth striæ very delicate.

Spire low-conoidal, apex obtuse; whorls 4½, rather convex. Aperture somewhat oblique, sublunate; peristome simple, thin, the upper lip arched forward; columellar lip dilated and subreflexed. Umbilical perforation minute, almost concealed in the adult.

Alt. 2, diam. 3 mill.

Kakepuku, Horokiwi, Wellington and Auckland, New Zealand.

H. conella PFR., Mal. Bl. viii, 1861, p. 147; Monogr. v, p. 86.—*Phrixgnathus conella* HUTTON, Trans. N. Z. Inst. xvi, p. 196.

Pfeiffer's description indicates a shell larger than the individual described above and figured; some others before me have rather higher spire.

L. ARIEL Hutton. *Unfigured.*

Shell small, depressed, scarcely shining, finely ribbed, subperforate; color pale yellowish-horny. Spire conoidal, depressed, with 5 slowly increasing whorls, the last obscurely carinated; finely striately ribbed, the base delicately spirally striatulate; suture impressed; umbilicus covered; aperture oblique, lunate; peristome thin, the columellar margin reflected.

Greatest diameter ·13, least ·12, height ·1 inch. (*Hutt.*)

North Island of New Zealand at Auckland, Wanganui Parua Bay near Whangarei.

Phrixgnathus ariel HUTTON, Trans. N. Z. Inst. xvi, pp. 177, 196, 1883.—SUTER, *l. c.*, 1891, p. 278.

Distinguished from the other species of the genus by being finely ribbed, and from *H. pœcilosticta* by the columella not being thickened, and the suture not margined. From *H. granum* it differs in color and in having the umbilicus covered. (*Hutton.*)

L. TRANSITANS Suter. Pl. 23, figs. 85, 86, 87.

Shell conoidal, subperforated, finely striated with growth lines, faintly shining; color pale yellow-horn, irregularly banded with chestnut; transparent, fragile. Spire conoidal, apex rather obtuse. Whorls 5, slowly and regularly increasing, rather flattened, the last acutely keeled, striæ very delicate, slightly arcuate; suture not deep, not margined. Aperture vertical, subrhomboidal; peristome rather thin, angulated; outer lip strongly callous, the white callosity reaching to a good distance in the interior. Columellar margin slightly deflexed, callous, short, regularly arched. Base convex. Umbilicus very narrow, partly covered. In young specimens the callosity extends very far backwards, and the umbilicus is open. Diameter, greatest 3, least 2½, height, 2½ mill. (*Sut.*)

Heavy Bush, Parua Bay, Whangarei (Ch. T. Musson).

Phrixgnathus transitans SUTER, Trans. N. Z. Inst. 1891, p. 297, t. 22, f. 40*a*, *b*.

This species is very near *Ph. marina* Hutt., but has no lamellæ or teeth in the aperture, and the suture is not margined. It may be

considered as an intermediate form between *Phrixgnathus* and the subgenus *Laoma*.

Among the few specimens none had the animal left in, and the dentition, therefore, remains unknown for the present. (*Suter.*)

L. MARGINATA Hutton. Pl. 23, figs. 94, 95, 96.

Shell small, conical, umbilicated, striated. Color pale horny-brown, regularly longitudinally banded with reddish-fulvous, the fulvous bands becoming obsolete near the mouth, base pale horny-brown. Spire conical, slightly acute; whorls 5½, flattened, sharply keeled; the first 1½ whorls smooth, but spirally striated, the rest longitudinally striated with growth-lines; base slightly convex, radiately striated, and very delicately spirally striatulated; periphery sharply keeled; suture marginated; umbilicus narrow, about one-tenth of the diameter; aperture vertical, rhomboidal; peristome thin, the outer and inner margins nearly parallel, columellar margin slightly reflected. Greatest diameter 0·15, least 0·13, height 0·1 inch.

Animal small, eye peduncles long, the tentacles moderate; body elongate, foot slightly produced behind beyond the shell. Color pale yellowish; peduncles, a stripe on each side of the head, and another short stripe in the middle on each side of the foot purplish-gray. Dentition, 40–1–40. (*Hutt.*)

Greymouth, New Zealand.

Phrixgnathus marginatus HUTTON, Trans. N. Z. Inst. xv, p. 137, 1882; *l. c.*, xvi, p. 196.

The figures were drawn from the type.

L. CELIA Hutton. Vol. IX, Pl. 1, fig. 10.

Shell trochoidal, narrowly umbilicated, carinated. Somewhat translucent, alternately flamed with white and reddish-brown above, horny-brown beneath. Surface apparently smooth and lustrous, but not glabrous; under a lens seen to be obliquely striated, decussated by very fine, crowded spiral lines.

Spire conical, composed of 5 whorls, which are rather convex and separated by simple, slightly impressed sutures. Last whorl distinctly but rather bluntly angular at the periphery, very convex below, and deeply indented around the umbilicus. Aperture slightly oblique; peristome thin, expanded at the columella.

Alt. 2, diam. 2½ mill.

New Zealand, at Wanganui, Wellington, Horokiwi and near Mauriceville, Forty-mile Bush, North Island; and Dunedin and Mulford Sound, Greymouth and Temuka, South Island.

Phrixgnathus celia HUTTON, Trans. N. Z. Inst. xvi, p. 176, 197, —SUTER, *l. c.*, xxiv, p. 274.—*Helix fatua* HUTTON, *l. c.*, xiv, p. 153, t. 3, f. N (jaw). Not *H. fatua* of Pfr.

The beautiful beading of the surface is a notable character, but is seen only under a strong lens.

L. PHRYNIA Hutton. Pl. 23, figs. 88, 89, 90.

Shell minute, conoidal, umbilicated, the epidermis plicated. Color pale horny, radiately streaked with rufous. Spire conoidal, acute; periphery obtusely angled; suture impressed; whorls 5, rounded, smooth, the epidermis rather distinctly wrinkled; umbilicus narrow, open; aperture slightly oblique, rotundly lunar; peristome thin, the margins approximating; the columellar margin scarcely reflected. Greatest diameter ·1, least ·09, height ·09 inch.

Very near *P. celia*, but differs in the plaited epidermis. (*Hutt.*)

Wanganui, North Island, New Zealand.

Phrixgnathus phrynia HUTTON, Trans. N. Z. Inst. xvi, p. 197.

L. ACANTHINULOPSIS Suter. Pl. 23, figs. 100, 1, 2.

Shell small, conoidal, umbilicated; color pale horny with regular broad streaks of rufous, faintly shining, transparent, fragile. Epidermis with slightly sinuated membranaceous plaits, about 12 in the tenth of an inch (5 per mill.). Spire conoidal, rather depressed. Whorls 5, slowly but regularly increasing, rounded; periphery carinated. Suture impressed. Aperture oblique, rotundly lunar. Peristome thin, straight; the margins slightly approximating. The columellar margin scarcely reflected, somewhat callous inside. Umbilicus moderate, deep, open, one-fourth of the diameter.

Diameter 0·12 in. (3 mm.), height 0·08 in. (2 mm.). (*Suter.*)

South Island N. Z., White Horse Hill, Hooker Valley. Amongst dead leaves and mould in the subalpine bush. Rather scarce.

This species is very near *Ph. phrynia*, Hutt., but the spire is more depressed and the umbilicus larger. Animal: jaw arcuate, not tapering, lamellate, the lamellæ flat, densely covered with hair-like papillæ; about five of the central lamellæ much broader than the others. Dentition: 21–1–21. Central tooth rectangular, much longer than broad, reflexed portion nearly half the length of the

base, unicuspid, marginal teeth twice as broad as the central tooth, bicuspid, the cutting-points growing larger and reaching the posterior margin of the base as they approach the margin of the radula. The last two teeth much broader than long, with rudimentary cusps. (*Sut.*)

Phrixgnathus acanthinulopsis SUTER, Trans. N. Z. Inst. 1890, p. 92, t. 18, f. 11, *a*, *b*, *S*, *T* (shell and dentition).

L. TITANIA Hutton. Pl. 23, figs. 82, 83, 84.

Shell globosely conoidal, umbilicated striated; pale horny, irregularly banded with chestnut. Spire conoidal, rather obtuse; periphery obtusely carinated; suture margined; whorls 5–6, rounded, very finely striated; umbilicus broad, perspective; aperture very slightly oblique, subcircular; peristome thin, the margins closely converging; columellar margin not reflected.

Greatest diameter ·14, least ·12, height ·10 inch. (*Hutt.*)

Differs from *P. sciadium* in the higher spire and the obtuse keel. (*Hutt.*)

Dunedin, S. Island, New Zealand.

Phrixgnathus titania HUTTON, Trans. N. Z. Inst. xvi, p. 177, 198 (1883).

The type specimen is figured.

L. HAASTI Hutton. Pl. 23, figs. 91, 92, 93.

Shell minute, depressed, smooth, shining, umbilicated; color horny, usually with irregular radiating bands of reddish brown and white. Spire conoidal, depressed; whorls 4½, slowly increasing, rounded, the last subcarinated, obscurely distantly striated; suture impressed; umbilicus moderate, pervious, showing the penultimate whorl; aperture subvertical, lunately subcircular; peristome thin, arched, the margins not approaching.

Greatest diameter ·12, least ·1, height ·07 inch.

Distinguished by its smooth, shining surface and brown and white bands. Its generic position must remain doubtful until the dentition is known. (*Hutt.*)

Mt. Somers, Canterbury, South I., New Zealand, on limestone cliffs.

Phrixgnathus (?) *haasti* HUTTON, Trans. N. Z. Inst. xvi, p. 177, 198.

L. PUMILA Hutton. Pl. 23, figs. 97, 98, 99.

Shell minute, sub-discoidal, umbilicated, thin, translucent, smooth, scarcely shining, with distant plait-like ribs; color horny brown. Spire slightly convex; whorls 4, increasing rather rapidly, rounded with regular, distant membraneous ribs, about 20 to 25 in the tenth of an inch, the interstices finely reticulated; suture impressed; umbilicus rather large, about one-fourth the diameter of the shell, graduated, pervious; aperture large, rather oblique, subcircular, broader than high; peristome thin, regularly arched, the columellar margin slightly reflected. (*Hutt.*)

Alt. ·75, diam. 1·75 mill.

Eyreton, N. Canterbury, and Christchurch, New Zealand.

Microphysa (?) pumila HUTTON, Trans. N. Z. Inst. xv, p. 134, 1882; *l. c.*, xvi, p. 195.—*Phrixgnathus pumilus* SUTER, *in lit.*

This species has much the aspect of Patula, but it is referred by Mr. Suter to *Phrixgnathus.*

L. MICRORETICULATA Suter. Pl. 23, figs. 13, 14, 15.

Shell very small, globosely elevated, horny-fulvous, shining, very thin, pellucid, finely striated, reticulated between the striæ. Spire conical, elevated. Whorls 5, rounded, regularly increasing. Suture impressed. Aperture oblique, rotundly lunar, but little excavated by the penultimate whorl. Peristome straight, acute, margins faintly convergent; columellar margin somewhat reflected, descending straight. Umbilicus narrow, deep.

Diameter 0·07 in. (1·7 mm.), height 0·05 in. (1·3 mm.). (*Suter.*)

Hastwell, Forty-mile Bush, N. Island, New Zealand.

Hyalina microreticulata SUTER, Trans. N. Z. Inst. xxii, 1889, p. 227, t. 15, f. 13*a*, *b*.—*Phrixgnathus microreticulata* SUTER, *in lit.*

L. ALLOCHROIDA Suter. Pl. 23, figs. 3, 4, 5, 6.

Shell very small, depressed; the first three whorls colorless, the penultimate yellowish-horny, and the last horny-fulvous; very thin, pellucid, with distant fine ribs, directed backwards on the surface and somewhat arcuated on the side; about 30 ribs in the tenth of an inch (12 per mm.). Distinctly reticulated between the ribs. Spire slightly elevated. Whorls 5, swollen, regularly increasing, the last not descending. Suture deep. Aperture slightly oblique, rotundly lunar, little excavated by the penultimate whorl. Peristome straight, acute, margins convergent, columellar margin

slightly reflected, slightly bent downward. Umbilicus very narrow. (*Suter.*) Alt. 1, diam 1·5 mill.

Near Mauriceville, in the bush, *North Island, New Zealand.*

Hyalina allochroida SUTER, Trans. N. Z. Inst. xxii, p. 228, t. 15, f. 14 *a–c;* with *var. sericata, loc. cit.*, f. 15 *a, b*, and *var. lateumbilicata*, f. 16 *a, b.—Phrixgnathus allochroida* SUTER, *in lit.*

Var. *sericata* Suter. Pl. 23, figs. 7, 8, 9.

Shell very small, depressed, yellowish-horny, thin, pellucid, closely and finely ribbed, ribs bent backwards on the surface, slightly undulating on the periphery; about 60 ribs in the tenth of an inch (25 per mm.). Spire slightly elevated. Whorls 5, slowly and regularly increasing, narrow, rounded, the last not descending. Suture deep. Aperture oblique, lunar, higher than broad, little excavated by the penultimate whorl. Peristome straight, acute, upper margin somewhat advancing, columellar margin not reflected, obliquely bent downwards. Umbilicus very narrow.

Diameter 0·05 in. (1·2 mm.), height 0·03 in. (0·7 mm.). (*Suter.*)

Under dead leaves and rotten wood in the bush. Found only one specimen. North Island; Forty-mile Bush; Hastwell. (*H. S.*)

Var. *lateumbilicata* Suter. Pl. 23, figs. 10, 11, 12.

Shell very small, depressed, yellowish-horny, shining, pellucid, thin, with rather distant ribs, bent backwards on the surface, oblique and undulated on the periphery. Interstices reticulated. Spire slightly elevated, apex smooth, colorless. Whorls 5, regularly and slowly increasing, narrow, rounded, the last rather descending. Aperture very oblique, rotundly lunar, little excavated by the penultimate whorl. Peristome straight, acute, margins convergent; columellar margin slightly reflected, arcuately bent downwards. Umbilicus open, deep, about one-fifth of the diameter.

Diameter 0·06 in. (1·5 mm.), height 0·04 in. (1 mm.).

Amongst dead leaves and mould in the bush. North Island; Forty-mile Bush; Hastwell. (*H. S.*)

Genus GERONTIA Hutton, 1883.

This name may be used in an enlarged sense to include all of the New Zealand Helices having a Patuloid shell, a caudal mucus gland and decidedly Patuloid rather than Zonitoid marginal teeth of the radula. For these forms Hutton proposed a family, *Charopidæ*: but on the ground that the genus *Charopa* was founded upon

a species of *Patula*, Suter has changed the family name to *Phenacohelicidæ*, including therein the genera *Phacussa* Hutt., *Thalassia* (Hutt. non Alb.), *Gerontia* Hutt., *Psyra* (Hutt. non Stal.), *Pyrrha*, *Therasia*, *Phenacohelix*, *Patulopsis* (Suter non Strebel), *Amphidoxa* (of N. Z. authors, non Alb.) and *Calymna*. Now with the exception of *Phacussa* and perhaps *Thalassia*, these groups have a dentition unequivocally Patuloid. The figures given by Hutton and by Suter do not satisfactorily show the contours of the basal plates (base of attachment) of the marginal teeth of *Phacussa* or *Thalassia*, and I can therefore offer no intelligent opinion upon the systematic position of those groups; but I am inclined to regard the marginal teeth as *pseudo*-zonitoid, rather than truly aculeate.

The names proposed for species of this group in chronological order are as follows:

1. *Gerontia* Hutt., Trans. N. Z. Inst. xv, p. 135, May, 1883. (Type *G. pantherina* Hutt.)

2. *Therasia* Hutt., Ibid. xvi, p. 182, May, 1884. (Type *T. celinde* Gray.)

3. *Calymna* Hutt., Ibid. xvi, p. 199, May, 1884. (Type *C. costulata* Hutt.)

4. *Pyrrha* Hutt., Ibid. xvi, p. 200, May, 1884. (Type *P. cressida* Hutt.)

5. *Psyra* Hutt., Ibid. xvi, p. 201, May, 1884, (Type *H. dimorpha* Pfr.)

6. *Phenacohelix* Suter, Ibid. xxiv, p. 270, 1891. (Type *H. pilula* Rve.)

7. *Patulopsis* Suter, Ibid. xxiv, p. 270, 1891. (Type *H. ide* Gray.)

For further notes, see *The Nautilus* for September, 1892, p. 54.

Section GERONTIA Hutton (*s. str.*).

G. PANTHERINA Hutton. Vol. IX, Pl. 3, figs. 1, 2, 3.

Shell depressed, broadly and deeply umbilicated, obtusely carinated above the periphery; thin and rather fragile; green-corneous, a little translucent. Surface lustrous, sculptured with close fine, unequal ribs of cuticle.

Spire slightly convex; whorls 4½, convex, separated by deep sutures, the last whorl not descending in front. Aperture oblique, round-lunar; peristome thin and simple; parietal wall smooth, blue-white. Alt. 4½, diam. 9 mill.

 Greymouth, New Zealand.

G. pantherina HUTTON, Trans. N. Z. Inst. xv, p. 135; Ibid. xvi, p. 166, 200, t. 9, f. I, t. 11, f. R (jaw and dentition).

This species has something the aspect of a small *Selenites concavus*, but the surface is finely and densely striated and the shoulder is obtusely angled.

G. CORDELIA Hutton. Pl. 22, figs. 34, 35, 36.

Shell subdiscoidal, widely umbilicated, striated; color pale horny, marbled with reddish-brown and covered with a shining yellow epidermis. Spire convex; whorls 4½, slowly increasing, rounded, with tolerably regular, rather crowded, and rather coarse striæ of old growth-lines, suture impressed; umbilicus broad, conical, showing all the whorls, but not gradated; aperture slightly oblique, subcircular peristome thin, right margin descending, columellar margin rapidly ascending but not vertical, the two margins not approaching. Greatest diameter ·32, least ·27, height ·18 inch. (*Hutt.*)

Titirangi, Auckland (T. F. Cheeseman).

G. cordelia HUTTON, Trans. N. Z. Inst. xvi, p. 179 (1884).

I place this species in Gerontia from the general appearance of the shell, but do not know the animal nor the dentition. It differs from *G. pantherina* in being more convex, in the epidermis not being plaited, in being more coarsely striated, in the right margin descending, in the aperture being less oblique, and in its colors. (*Hutt.*)

My figures were drawn by Mr. Suter from Prof. Hutton's type.

Section ALLODISCUS Pilsbry.

Allodiscus PILS., The Nautilus, Sept. 5, 1892, p. 56, type *H. dimorpha* Pfr.—*Psyra* HUTTON, Trans. N. Z. Inst. xvi, p. 201, May, 1884.—Not *Psyra* Stal, 1876, a genus of Orthoptera.

G. DIMORPHA Pfr. (vol. II, p. 211).

G. CASSANDRA Hutton. Pl. 22, figs. 37, 38, 39.

Shell depressed, subperforate, closely ribbed; color pale horny, with longitudinal angulated bands of chestnut. Spire conoidal, depressed, obtuse; whorls 5½, gradually increasing, very finely ribbed; ribs about 20 in the tenth of an inch; periphery rounded; suture impressed; umbilicus very narrow, almost covered; aperture rather oblique, rotundly lunate; peristome acute, straight, the mar-

gins not approaching; columellar margin obliquely ascending, slightly reflected and thickened. Diameter ·5 inch. (*Hutt.*)

The generic position of this shell is very doubtful; it somewhat resembles *H. iguiflua*, but differs in its very narrow umbilicus. The only specimens I have seen were old and rubbed. (*Hutt.*)

Napier, North I., New Zealand.

Charopa (?) *cassandra* HUTT., Tr. N. Z. I. xvi, p. 181.—*Psyra cassandra* HUTT., Ibid., p. 201.

My figures were drawn from Prof. Hutton's type.

G. VENULATA Pfr. (See Trans. N. Z. Inst. xvi, p. 201; Manual II, p. 211.)

G. TULLIA Gray. (Manual vol. II, p. 211.)

G. ADRIANA Hutton. *Unfigured.*

Shell small, discoidal, narrowly umbilicated, finely ribbed; color pale horny with spots and angular streaks of chestnut. Spire flat; whorls 4½, slowly increasing, rounded, delicately ribbed; ribs about 50 in the tenth of an inch, the interstices reticulated; suture impressed; umbilicus narrow, but open; aperture slightly oblique, rotundly lunar; peristome thin, regularly arched, the columellar margin slightly reflected.

Greatest diameter ·16, least ·14, height ·07 inch. (*Hutt.*)

Bank's Peninsula; and Napier, North I., New Zealand.

Fruticicola adriana HUTT., Tr. N. Z. Inst. xvi, p. 175.—*Psyra adriana* HUTT., Ibid. p. 201.

The specimens before me are immature. Hutton says: spire flat, closely ribbed; ribs about 40 in the tenth of an inch; umbilicus narrow but open.

G. PLANULATA Hutton. Vol. IX, Pl. 3, figs. 4, 5, 6.

Shell small, depressed, subperforated, closely ribbed, rather shining; color horny-brown, sometimes clouded with rufous. Spire slightly elevated, flatly convex; whorls 4½–5, slowly increasing, rounded, ornamented with fine, slightly undulating ribs about 35 to 40 in the tenth of an inch, the interstices finely striated with growth lines; last whorl rounded at the periphery, but slightly flattened below; sutures impressed; umbilicus very narrow and generally covered over by the reflected columellar lip; aperture subvertical, transversely rotundly lunar; peristome thin; the right

margin descending, then arched; columellar margin thickened, rapidly ascending and slightly reflected; basal margin rather flattened; interior slightly callous.

Greatest diameter ·15, least ·12; height ·6 inch. (*Hutt.*)

Auckland and Greymouth, New Zealand.

Charopa planulata HUTT., Trans. N. Z. Inst. xvi, p. 181, t. 9, f. I (dentition).—*Psyra planulata* HUTT., Ibid. p. 202.

In the specimen figured there are about 21 riblets per millimeter upon the front of the body-whorl at the periphery.

G. MIRANDA Hutton. Pl. 22, figs. 40, 41, 42.

Shell minute, depressed, imperforate, finely ribbed; color pale horny, tessellated with rufous. Spire flatly conoidal, obtuse; whorls 5–6, rounded, very slowly increasing; the first smooth, the second and third with rather distant, delicate ribs, which get closer and after the third whorl are very close and fine, about fifty in the tenth of an inch; umbilicus very narrow, covered; suture impressed: aperture subvertical, lunate: peristome simple, about three-fourths of a circle, the columellar margin slightly callous and reflected. Greatest diameter ·15, least ·14, height ·11 inch. (*Hutt.*)

Animal: mantle subcentral; tail truncated, with a mucus gland below a papilla; eye peduncles thick, approximated at their bases. Anterior portion of the animal, including the eye peduncles and tentacles, pale purplish, the peduncles darker: a narrow white line down the back; foot and the rest of the body yellowish-white. (*Hutt.*)

Greymouth, New Zealand.

Charopa miranda HUTT., Trans. N. Z. Inst. xvi, p. 180, t. 9, f. w, t. 11, f. 8 (dentition and jaw).—*Psyra miranda* HUTT., Ibid. p. 202.

My figures are drawn from Prof. Hutton's type.

G. GODETI Suter. Pl. 22, figs. 43, 44, 45.

Shell discoidal, perforated, color horny, without any markings, not shining, transparent, thin, with strong, rather distant, and almost straight radiating ribs, about 23 in the tenth of an inch (9 per mm.). Spire flat. Whorls 5, slightly rounded, narrow, regularly increasing, the last not descending. Suture impressed. Aperture subvertical, lunar, considerably excavated by the penultimate whorl. Peristome straight, simple, basal margin slightly

arcuated. Columellar margin very short, but little reflected, slightly thickened. Umbilicus very narrow, but open. (*Suter.*)

Alt. 2·5, diam. 4·5 mill.

Foot of Scady Range, Hooker Valley, South Island, N. Z.; under stones.

Psyra godeti SUT., Trans. N. Z. Inst. xxiii, p. 90, t. 17, f. 8, *a*, *b* (shell); O, P (jaw and dentition).

Stands nearest to *Psyra tullia* Gray, but is easily distinguished by the absence of color-markings, the stronger more distant ribs and the open umbilicus.

Section PHENACOHELIX Suter, 1891.

G. IOTA Pfr. (Vol. II, p. 212.)

G. GRANUM Pfr. (Vol. II, p. 212.)

G. CHORDATA Pfr.

Section SUTERIA Pilsbry.

Suteria PILS., *The Nautilus*, Sept. 5, 1892, p. 56, type *H. ide* Gray.—*Charopa* HUTTON, *olim*, *non* Albers.—*Patulopsis* SUTER, Trans. N. Z. Inst. xxiv, p. 270, 1891, type *H. ida* Gray; not *Patulopsis* Strebel, 1879, a Mexican group of *Zonitidæ*.

G. IDE Gray. (Vol. II, p. 210.)

G. ZICZAC Gould. (Vol. II, p. 210.)

This species, described in 1846, is evidently distinct from *H. ide* Gray. The specimens were found by Dr. Pickering, of the U. S. Expl. Exped., in a crater near Taiaimi, N. Z.

Section THERASIA Hutton, 1884.

A. Subperforate species.

G. CELINDE Gray. (Manual II, p. 211.)

G. VALERIA Hutton. Pl. 22, figs. 46, 47, 48.

Shell globose-conoidal, depressed, finely ribbed, subperforate; color pale horny, irregularly marked with rufous. Spire conoidal, obtuse; periphery obtusely angled; suture scarcely impressed; whorls 4–5, rather flattened, irregularly finely ribbed, both above and below, ribs about 20–25 in the tenth of an inch; umbilicus very narrow, covered; aperture oblique, angularly lunate; peristome

simple, the margins not converging; columellar margin reflected. Greatest diameter ·25, least ·2, height ·15 inch. (*Hutt.*)

Dunedin, New Zealand.

Therasia valeria HUTT., Tr. N. Z. Inst. xvi, p. 183, 202, t. 9, f. N.—*H. hypopolia* HUTT., Ibid. xiv, p. 151, t. 3, f. B, not of Pfr.

Differs from *thaisa* in the narrow umbilicus, from *ophelia* in being ribbed. My figures were drawn by Mr. Suter from Prof. Hutton's type.

G. OPHELIA Pfr. (Manual II, p. 211.)

B. Narrowly umbilicated species.

G. TAMORA Hutton. Pl. 22, figs. 49, 50, 51.

Shell small, conical, umbilicated, with membranous plaits; color horny-brown. Spire conical, rather acute; periphery subangled; suture impressed; whorls 5–6, rather flattened, finely striated and with irregular distant membranous ribs, easily rubbed off; umbilicus narrow but open; aperture transversely oval; peristome thin, the margins converging. (*Hutt.*) Alt. 2·5, diam. 4 mill.

Auckland, New Zealand.

Therasia tamora HUTTON, Tr. N. Z. Inst. xvi, p. 182, 202.

Differs from *celinde* in the open umbilicus, and from *decidua* in being more conical and smaller. My figure is from the type.

G. THAISA Hutton. Vol. IX, Pl. 3, figs. 14, 15, 16.

Shell rather solid, depressed, umbilicated, striated; color pale brown, usually irregularly banded and marked with reddish-brown. Spire conoidal, obtuse; whorls 5–5½, slowly increasing, rather flattened, more or less obscurely angled, strongly but irregularly striated; suture impressed; umbilicus rather narrow, about one-seventh of the least diameter of the shell; aperture rather oblique, rotundly lunate; peristome thin, the columellar margin rapidly ascending and rather reflexed. Greatest diameter ·4, least ·35 height ·28 inch.

Animal elongated; the foot long and narrow, reaching beyond the shell, rounded behind, slightly truncated and with a mucus gland situated under a caudal papilla. Mantle subcentral, included; body roughish; peduncles long, cylindrical, approximated at their bases; tentacles moderate. Top of the head yellowish-white, peduncles, tentacles, and a line down each side of the head dark gray; a broad longitudinal band of white, with a dark gray line

in the center, runs along each side, and below the band the foot is edged with alternate broad gray and narrow white tranverse bands. (*Hutt.*)

Auckland, Napier, Wellington, North Island; and Waipara, Waitaki, Queenstown, Dunedin, Lake Guyon, Waiau, Southland, South Island, N. Z.

Therasia thaisa HUTT., Trans. N. Z. Inst. xvi, p. 182, t. 9, f. M, t. 11, f. T (jaw and dentition).—*Helix ophelia* Rve., non Pfr.

A common species in limestone districts of the South Island. My figures were drawn by Mr. Suter from the type.

G. DECIDUA Pfeiffer. Pl. 22, figs. 52, 53, 54.

Shell depressed, subglobose, thin and fragile, narrowly umbilicated. Surface having oblique striæ and very fine, close spiral striæ. Brownish-horny, obscurely marked with brown, subtranslucent.

Spire low-conoid, apex obtuse. Whorls 5, the last obtusely angled above the middle. Aperture somewhat oblique, round-lunate; peristome thin, simple, expanded at the umbilicus.

Alt. 6, diam. 8½ mill.

Auckland; Wangaruru, N. Z.

H. *decidua* Pfr., Monogr. iv, p. 71.—*Therasia decidua* HUTT., Trans. N. Z. Inst. xvi, p. 203.

G. TRAVERSI E. A. Smith. (Vol. II, p. 214.)

Allied to the last, but more distinctly marked with brown and with more acute carina.

Section THALASSOHELIX Pilsbry.

Thalassohelix PILS., *The Nautilus*, Sept. 5, 1892, p. 56, type *H. zelandiæ*.—*Thalassia* of HUTTON and other New Zealand authors. —?? *Thalassia* ALBERS, Die Hel. 1860, p. 59. Not *Thalassia* Chevrolat, 1834, a genus of Coleoptera.

It is somewhat doubtful whether the New Zealand species belong to *Thalassia* of Albers, if we restrict that group to species similar to its type, *H. subrugata* Pfr., of Australia. This species presents certain conchological features which would cause me to separate it from the following New Zealand forms, even if a change of the name were not necessary on the ground of preoccupation.

G. PORTIA Gray. (Vol. II, p. 213.)

G. LAMBDA Pfr. (Vol. I, p. 129.) *H. igniflua* of Rve. is a synonym.

G. PROPINQUA Hutton. Pl. 22, figs. 55, 56, 57.

Shell depressed, striated, narrowly umbilicated; color pale horny with numerous narrow zigzag red bands, which are often broken up into a series of spots. Spire convexly conoidal, apex obtuse; whorls 4–5, rather flattened, the first two smooth, the rest very strongly striated with oblique growth lines; last whorl carinated, the base rounded; suture impressed; umbilicus narrow; aperture oblique, rotundly lunate, anteriorly subangled; peristome thin, the columellar margin reflected. Greatest diameter 0·24, least 0·2, height 0·16 inch. Dentition 21–1–21. (*Hutt.*)

North Island of New Zealand at Auckland and Hawke's Bay: South Island at Weka Pass and Southland.

Thalassia (?) *propinqua* HUTT., Trans. N. Z. Inst. xv, 1882, p. 137 (1883).—*T. propinqua* HUTT., Trans. xvi, p. 169, t. 10, f. G, t. 11, f. V (dentition and jaw); p. 203.

Allied to *H. zelandiæ* but less acutely keeled, more strongly striated and differently colored. My figures are drawn from the type.

G. ZELANDIÆ Gray. (Vol. II, p. 214.)

G. OBNUBILA Reeve. (Vol. I, p. 120.) *H. sigma* Pfr. *MS.* is a synonym.

Section PYRRHA Hutton, 1884.

Trans. N. Z. Inst. xvi, p. 200.

G. CRESSIDA Hutton. Vol. IX, Pl. 3, figs. 17, 18, 19.

Shell turbinate, depressed, thin, translucent, striated, umbilicus covered; fulvous-horny, spire convex; whorls 5½, slowly increasing, rounded, shining, finely irregularly striated or plaited; suture impressed; umbilicus very narrow, covered by the peristome; aperture slightly oblique, lunately rotund; peristome thin, regularly arched, the columellar margins slightly thickened and reflected over the umbilicus. Greatest diameter ·48, least ·38, height ·33 inch. (*Hutt.*)

Wellington, N. Isl.; and Preservation Inlet, Haast River, Southland and Greymouth, S. Island, New Zealand.

Pfeifferia (?) cressida HUTT., Trans. N. Z. Inst. xvi, p. 178, t. 9, f. X, t. 11, f. N (jaw and dentition).—*Pyrrha cressida* HUTT., *l. c.*, p. 200.

In this species the shell is seen, under the microscope, to be finely obliquely reticulated, the crossing striæ having diagonal directions. I formerly mistook it for *H. guttula* but in that species the shell is described as very smooth, with an inconsiderable, submarginated suture, and the last whorl as callous beneath, in all of which points it differs from our species.

H. GUTTULA Pfeiffer. (Vol. II, p. 211.) This is said by Suter to be no New Zealand shell, but probably from Mauritius (Trans. N. Z. Inst. xxiv, p. 281).

Section CALYMNA Hutton, 1883.

Calymna HUTTON, Tr. N. Z. Inst. 1883, p. 199, + *Amphidoxa* Hutton and Suter. Not *Amphidoxa* Albers, 1850.

It is difficult to see why the New Zealand species have been referred to the South American group *Amphidoxa*. I have compared specimens of the shells, which seem to be sufficiently distinct; and we have no reason to believe that the anatomy will prove identical. Those who advocate a former land connection between South America and New Zealand may consider this a sufficient reason for uniting the species of New Zealand and Juan Fernandez in one group, without a comparison of either shells or anatomy; but conservative malacologists will demand more evidence before accepting either the malacological or the geographical theory.

Calymna was proposed to include the species with ribbed whorls, the type being *C. costulata* Hutton; but the smoother forms (which New Zealand writers refer to Amphidoxa) will also be included in Hutton's group, as they do not differ in anatomy, and the difference in shell characters is not sufficient for sectional separation.

A. Whorls ribbed. Typical Calymna.

G. COSTULATA Hutton. Vol. IX, Pl. 3, figs. 20, 21, 22.

Shell small, subdiscoidal, umbilicated, shining but not polished, ribbed; color pale horny, longitudinally banded with reddish, the bands absent on the last half of the last whorl. Spire almost flat, whorls 3½, rapidly increasing, rounded, ornamented with fine spiral striatulations and close ribs, about 40 to 45 in the tenth of an inch,

the interstices very finely reticulated; suture impressed; umbilicus a narrow perforation at the bottom of a broad funnel-shaped depression, which is ribbed like the rest of the whorls; aperture oblique, transversely ovate; peristome thin, regularly arched. Greatest diameter 0·14, least 0·1. Dentition 14–1–14. (*Hutt.*)

Province of Auckland, New Zealand.

Amphidoxa costulata HUTTON, Trans. N. Z. Inst. 1882, p. 136; *l. c.*, 1883, p. 171, t. 10, f. A (dentition).—*A.* (*Calymna*) *costulata* HUTTON, *l. c.*, 1883, p. 199.—*Calymna costulata* SUTER, *l. c.*, 1891, p. 277.

Distinguished by its ribbing and spiral striation. The figures were drawn by Mr. Suter from Prof. Hutton's type.

G. LAVINIA Hutton. *Unfigured.*

Shell subdiscoidal, umbilicated, ribbed; color yellow-horny, mottled with rufous on the upper side. Spire flat; periphery rounded; suture scarcely impressed; whorls 3½, rapidly increasing, rather flattened above, rounded below; upper surface not shining, evenly and closely ribbed, ribs about 18 in the tenth of an inch; lower surface smooth, shining, longitudinally striated and irregularly spirally striatulated; umbilicus moderate, showing all the whorls; aperture oblique, rotundly lunar; peristome thin, the margins approaching; columellar margin not reflected.

Greatest diameter ·5, least ·4, height ·25 inch. (*Hutt.*)

Palmerston; Wellington, N. Z.

A. lavinia HUTTON, Trans. N. Z. Inst. 1883, p. 180, 199.

Umbilicus wider than in *A. costulata*, and ribbing coarser, besides being much larger.

G. FEREDAYI Suter. Pl. 22, figs. 58, 59, 60.

Shell small, globosely depressed, imperforate, shining, pale-horny, without markings, thin, transparent; with fine ribs, arcuated on the surface and disappearing beneath, about 25 to 30 in the tenth of an inch (10–12 per mm.). Spire short, obtuse. Whorls 3½, rapidly increasing, rounded. Suture impressed. Aperture oblique, rotundly ovate. Peristome thin, straight, regularly arched, the upper part advancing. Columellar margin somewhat bent to the left, not reflexed. Margins approximating. Umbilical region infundibuliform, imperforate. Diameter 0·14 in. (3·5 mm.), height 0·08 in. (2 mm.). (*Suter.*)

Hastwell, Forty-mile Bush, North Island, N. Z.

Amphidoxa (*Calymna*) *feredayi* SUT., Tr. N. Z. Inst. 1890, p. 91, t. 18, f. 10 *a*, *b* (shell), Q, R (dentition and jaw).

G. OLIVACEA Suter. Pl. 22, figs. 61, 62, 63.

Shell globosely depressed, perforated, shining, pale yellow-olive, without markings, thin and transparent, with very close-set arcuated ribs, which are flatly rounded, about 10 per mm., interrupted on the surface with several distinct spiral grooves. Spire slightly elevated, obtuse; apex smooth. Whorls 3, rather rapidly increasing, rounded, the last slightly flattened on the surface, rounded on the base. Suture deep. Aperture oblique, rotundly ovate, slightly excavated by the penultimate whorl. Peristome very thin, straight, regularly arched, the upper part advancing. Columellar margin not reflected, sharp, vertically slightly arcuated; outer margin strongly arched, the margins approximating. Umbilicus very narrow, not deep; umbilical region infundibuliform, faintly striated.

Alt. 3½, greater diam. 5, lesser 4 mill. (*Suter.*)

Hillyer's Creek, near Auckland, N. Z.

Amphidoxa (*Calymna*) *olivacea* SUTER, Tr. N. Z. Inst. 1891, p. 290, t. 21, f. 13 *a*, *b* (shell), 14, 15 (jaw and dentition).

B. Shell smooth, polished.

G. OMEGA Pfr. (*H. compressivoluta* Rv.). Vol. I, p. 128.

G. CORNEA Hutton. Pl. 22, figs. 64, 65, 66.

Shell thin, depressed, imperforate, striated, translucent; color pale horny. Spire slightly convex; whorls 2½, rapidly increasing, rounded, smooth, polished, finely striated with growth lines; suture impressed; aperture very oblique, transversely oval; peristome thin, regularly arched, columellar lip slightly reflected. Greatest diameter 0·25, least 0·2. Dentition 17–1–17.

From *A. compressivoluta* this shell may be distinguished by the whorls being convex instead of flattened; from the other New Zealand species of *Amphidoxa* by being imperforate, and of a pale horny color without markings and without ribs. The mantle of the animal is marbled with black, which shows through the shell. (*Hutt.*)

Auckland, N. Z.

Amphidoxa cornea HUTTON, Trans. N. Z. Inst. xv, p. 136, 1882; *l. c.*, 1883, p. 171, t. 10, f. A (dentition).

My figures were drawn by Mr. Suter from Prof. Hutton's type.

G. CORNEOFULVA Pfeiffer. Pl. 22, figs. 67, 68, 69.

Shell umbilicated, depressed, suborbicular, thin, lightly striatulate, distinctly so toward the sutures, shining, pellucid, corneous-tawny; spire slightly elevated; suture impressed; whorls 5, slightly convex, regularly increasing, the last subdepressed-rounded. Umbilicus narrow, slightly exceeding one-sixth the diameter of the shell. Aperture little oblique, rotund-lunar; peristome simple, straight, margins remote, the columellar margin arcuately sloping, slightly dilated above. Alt. 4⅓, greater diam. 9½, lesser 8¼ mill. (*Pfr.*)

New Zealand (Hochstetter).

H. corneofulva PFR., Mal. Bl. viii, 1861, p. 148; Novit. Conch. iii, p. 325, t. 78, f. 11–13.—*Ampidoxa corneofulva* SUTER, Trans. N. Z. Inst. 1891, p. 287, t. 20, f. 5 *a*, *b* (shell), 6, 7 (jaw and dentition).

This species was referred by Hutton to *Hyalina cellaria*, but Suter has identified it with specimens of a *Calymna* from Nelson Range, South Island, N. Z.

G. ZEBRA Le Guillon, 1842. (See *P. phlogophora*, vol. I, p. 128.)

Hutton is doubtless correct in including as synonyms *H. phlogophora* Pfr., 1849; *H. flammulata* Pfr., 1852; *H. umbilicata* H. & J., 1854.

G. JACQUENETTA Hutton. Pl. 22, figs. 70, 71, 72.

Shell perforate, flattened, keeled; color pale brown. Spire flat, or very slightly convex; whorls 2½, rapidly increasing, very slightly convex, the last acutely keeled and rounded on the lower surface; smooth, delicately striated with growth lines, the surface very finely and irregularly diagonally reticulated, and crossed with faint distant spiral striæ; suture impressed; umbilicus very narrow; aperture (?). Greatest diameter ·2, least ·12, height ·06 inch. (*Hutton.*)

Greymouth, New Zealand.

Amphidoxa jacquenetta HUTTON, Trans. N. Z. Inst. xvi, p. 179, t. 10, f. C (dentition).

Distinguished by its keeled whorls. My figures are from drawings of Prof. Hutton's type, furnished by Mr. Suter.

G. PERDITA Hutton. Pl. 22, figs. 73, 74, 75.

Shell thin, shining, pellucid, depressed, umbilicated; color pale olive-horny. Spire convex; whorls 3½–4, rapidly increasing, rounded, finely irregularly striated; suture deeply impressed; umbilicus narrow, pervious; aperture oblique, lunately circular;

peristome thin, the right margin joined closely to the next whorl. Greatest diameter ·23, least ·2, height ·18 inch.

The shell differs from *H. chiron* in being higher, the umbilicus narrower, and the right margin of the peristome not advancing. From *H. novaræ* it differs in being striated, in the suture being impressed and the spire convex. From *A. cornea* it differs in being umbilicated.

Animal with the mantle central, slightly reflected over the peristome of the shell: tail pointed, depressed, with a mucus gland. Color dark slate-gray, the mantle marbled with black and white; sole of the foot dirty yellowish. (*Hutt.*)

Auckland, Wanganui and Wellington, North Island; Greymouth, South Island, New Zealand.

Amphidoxa perdita HUTTON, Trans. N. Z. Inst. xvi, p. 179, t. 11, f. C and Q (dentition and jaw).

G. CHIRON Gray. (Vol. I, p. 129.)

The specimens from Ohaupo, collected by Mr. Chas. T. Mousson, and of which I give figures (pl. 22, figs. 76, 77, 78), are so strongly plaited that I first took them for a new species, closely allied to *A. chiron*; but the dentition is decidedly that of the species mentioned, as described and figured by Professor F. W. Hutton in Trans. N. Z. Inst., vol. XVI. This species seems to vary very much with regard to the plaits. Specimens I collected in the Forty-mile Bush show almost no trace of plaits, but only well developed growth lines. The shells from Ohaupo correspond with Gray's description, though I should not call them plaited, but ribbed. *A. chiron* may be considered as an intermediate form between *Amphidoxa* s. str. and the subgenus *Cydmona* Hutton, which includes the forms with ribbed whorls. (*Suter.*)

G. CREBRIFLAMMIS Pfr. (Vol. I, p. 130).

CARTHÆA (vol. III, p. 37).

The position of this group is uncertain.

H. FLOSCULUS Cox. Pl. 22, figs. 79, 80, 81.

Shell depressed-trochiform, imperforate, thin but solid, carinated at the periphery. Color variable; either (1) alternately streaked with brown or corneous and cream-white, or (2) chestnut-brown above and below, having a creamy peripheral line and columellar

spot, or (3) streaked, and having a dark band just below the periphery. Surface nearly smooth.

Spire low-conoidal, apex obtuse; whorls 5, very slightly convex, the last not descending in front, narrowly excavated at the axis. Aperture oblique, lunate, white and dark within; peristome thin and simple, very shortly reflexed at the columellar insertion.

Alt. 7, diam. 10 mill.

Norfolk Island.

H. floseculus Cox, P. Z. S. 1865, p. 695; Journ. de Conchyl. 1866, p. 48.—Pfr., Monogr. v, p. 128.

This species has much resemblance in form and color to *H. kiri* Gray, of New Zealand; and it probably belongs to the same genus, although it may prove to be a *Nanina*.

Genus PATULA (vol. III, p. 19).

P. viridescens Melvill & Ponsonby. Pl. 30, fig. 32.

Shell profoundly, broadly umbilicated, thin, flat depressed, whitish, covered with a corneous cuticle. Whorls 3, rapidly increasing, smooth, shining; the last whorl large, subeffuse. Aperture lunar-ovate, oblique; peristome simple, thin. Alt. 2, diam. 5 mill. (*M. & P.*)

Pretoria, Transvaal.

H. (*Patula*) *viridescens* M. & P., Ann. and Mag. N. H. (6), viii, p. 238; *l. c.*, vol. ix, t. 4, f. 1.

A small shell with olivaceous epidermis and of simple character.

P. spurca Sowerby. Pl. 36, figs. 1, 2.

Shell narrowly umbilicated, suborbicular, thin, whitish variegated with rufous, hardly shining; spire little elevated, obtuse at apex; whorls 5, a little convex, regularly and slowly increasing, striated with oblique, flexuous, close growth lines; last whorl rounded at the periphery, hardly descending in front; aperture wide-lunate, simple, scarcely toothed or lirate; peristome thin, the columellar margin slightly expanded and reflexed.

Alt. $3\frac{2}{3}$, greater diam. 5, lesser $4\frac{1}{2}$ mill.; aperture $2\frac{1}{4}$ long, $1\frac{2}{3}$ wide. (*Smith.*)

Sugarloaf Hill and Quarry, St. Helena (extinct).

Helix spurca Sowb., in appendix to Darwin's Geol. Obs. on the Volcanic Islands, etc., p. 157.—Forbes, Journ. Geol. Soc.

Lond. viii, p. 199, t. 5, f. 10.—*Hyalina spurca* WOLLASTON, Test. Atl. p. 534.—*Patula spurca* SMITH, P. Z. S. 1892, p. 260, t. 21, f. 1, 1*a*.

In some specimens the spire is more elevated than in others, and occasionally the apex is scarcely raised above the last whorl. The majority of the examples examined have to a great extent lost their original color and are now of a uniform whitish tint; but a few from Sugarloaf Ridge, which have the appearance of live shells, look of a pale reddish color to the naked eye, but when viewed under a lens it is seen that they are variegated with irregular radiating blotches of red and white intermingled. The lines of growth are distinct, finely hair-like, arcuate and oblique on the upper surface and gently undulating on the body whorl. The umbilicus is deep but narrow, equalling about one-fifth the diameter of the base. (*Smith.*)

P. DIANÆ Pfeiffer. Pl. 36, figs. 3, 4, 5.

Shell umbilicated, depressed, discoidal, rather thin, closely striated and irregularly varicose, slightly shining, black-brown; spire plane; whorls 4, convex; the last not descending, subdepressed-rotund; umbilicus one-fourth the diameter. Aperture suboblique, lunate-circular; peristome simple, straight, margins converging, the columella a little dilated above. Alt. 2, greater diam. 4⅔, lesser 4 mill. (*Pfr.*)

Diana's Peak, St. Helena (living).

Helix dianæ PFR., Mal. Bl. 1856, p. 206; Monogr. iv, p. 103.—*Hyalina dianæ* WOLL., Test. Atl. p. 534.—*Patula dianæ* SMITH, P. Z. S. 1892, p. 261, t. 21, f. 2, 2*b*.

Closely allied to *P. spurca*.

P. PERSOLUTA Smith. Pl. 36, figs. 9, 10, 11.

Shell minute, broadly and openly umbilicated, discoidal, planorbiform, pale reddish (?); whorls 3½, very convex, separated by a very deep suture, rather rapidly increasing, striated with oblique growth lines; the last whorl tube-shaped, rounded, free from the preceding and descending in front; aperture subcircular, the columellar margin slightly flattened. Alt. 2, greater diam. 3½, lesser 2¾ mill. (*Sm.*)

Side Path, St. Helena (extinct).

P. persoluta E. A. SMITH, P. Z. S. 1892, p. 261, t. 21, f. 3–3*b*.

This is a very remarkable little species, at once recognized by its planorbiform appearance, and the detached anterior portion of the body whorl. The upper whorls do not rise above the last, and the suture is remarkably deep. The umbilicus is very wide and open, permitting the convolutions of the whorls to be observed to the apex. Both of the specimens examined exhibited traces of red towards the apex, and there is every probability of the living shell having exhibited more or less of that tint. (*Sm.*)

P. LÆTISSIMA Smith. Pl. 36, figs. 6, 7, 8.

Shell minute, narrowly umbilicated, depressed, subconoid; white with radiating reddish spots above and below. Whorls 5½, slowly increasing, a little convex above, separated by a rather deep suture, striated with strong growth-lines; the last whorl rounded at the periphery, hardly descending in front. Aperture half-lunate, toothless; peristome thin, simple, the columellar margin dilated; umbilicus profound, narrow, one-fifth the diameter of the shell.

Alt. 2⅓, greater diam. 4, lesser 3½ mill. (*Sm.*)

Sugarloaf Ridge, near the top, St. Helena (extinct).

P. lætissima SMITH, P. Z. S. 1892, p. 261, t. 21, f. 4–4b.

This little species is remarkable for its small deep umbilicus, the toothless aperture, rather well marked lines of growth, the rounded periphery to the body whorl, and the red color markings. These consist of radiating blotches on the upper surface of the whorls, which become rather angular and wavy on the middle and lower part of the body-whorl. (*Sm.*)

P. APERTA v. Moellendorff. Pl. 37, figs. 35, 36, 37.

Shell minute, disk-shaped, *broadly umbilicated*, the umbilicus shallow, showing all the whorls, its width contained 2½ times in the diameter of the shell. Spire almost flat, composed of 3¼, slowly increasing, convex whorls, the last rounded at the periphery, not descending in front. Sculptured with delicate and rather close thread like rib striæ in the direction of growth lines. Color whitish. Aperture small, oblique, round-lunar; peristome simple, thin, the columellar margin dilated. Alt. 0·55, diam. 1·5 mill.

Montalban, near Manila, Luzon.

The above description and the figures are drawn from specimens kindly furnished by Dr. v. Mollendorff. The species is remarkably depressed, the umbilicus is wider and the aperture smaller than in

any of the allied forms. The apical whorl seems to be smooth, but I saw no abrupt change in sculpture between it and the following whorls; the species is therefore a true *Patula*.

P. LEPTA Westerlund. Pl. 30, figs. 36, 37, 38.

Shell small, narrowly umbilicated, convex-depressed; densely and delicately membranaceously-lamellate above and below, scarcely shining, yellowish-corneous, the same color above and beneath. Spire convex, obtuse; whorls 3½–4, rather slowly, regularly increasing, convex, separated by a profound suture; the last whorl obtusely angulated above, much more convex beneath, not descending in front. Aperture large, lunate-rounded; peristome thin, columellar margin widely patulous above. Alt. 1, diam. 1½ mill. (*West.*)

Nagasaki, Japan.

H. (Patula) lepta WEST., Vega-Expeditionens Vetenskapliga Iakttagelser, iv, p. 195, t. 3, f. 7, 1887.

This little species is allied to *amblygona* Reinh. and *flocculus* Mor.

H. LEPTOTERA Mabille & Rochebrune. Pl. 21, figs. 21, 22, 23.

Shell broadly and perspectively umbilicated, depressed, thin, pellucid, very fragile, corneous-rufescent, a little shining, closely ribstriate, and having yellowish streaks here and there. Spire subcompressed, scarcely projecting, apex very minute, eroded; whorls 5–6, narrowly convex, regularly and rapidly increasing, separated by a profound suture; the last whorl large, obscurely angular at its origin, not descending at the aperture, flattened beneath, obtusely angulated around the umbilicus. Aperture small, round-lunate, oblique: peristome straight, simple, acute, the margins distant.

Alt. 3, greater diam. 5, lesser 4 mill. (*M. & R.*)

Orange Bay, Patagonia.

Patula leptotera M. & R., Bull. Soc. Philom. Paris, 1885–6, p. 123; Miss. Sci. Cap Horn, Moll. p. 16, t. 6, f. 6.

H. RIGOPHILA Mabille & Rochebrune. Pl. 21, figs. 18, 19, 20.

Shell broadly and perspectively umbilicated, depressed orbiculate, thin, fragile, subpellucid, very sharply striate-costulate; rufescent; spire flattened, apex very minute, smooth; whorls 4, exactly rotund, very rapidly and irregularly increasing, separated by a deeply impressed, but non-canaliculate suture; the last whorl large, convex-

rotund, not descending in front, a trifle compressed below, obscurely angulated around the umbilicus. Aperture oblique, lunate-rotund, peristome simple, acute, margins subapproximating.

Alt. 3, greater diam. 6, lesser 5 mill. (*M. & R.*)

Around Orange Bay, Patagonia, at 100 meters alt.

Patula rigophila Mab., Bull. Soc. Philom. Paris, 1885–86, p. 123. —M. & R., Miss. Sci. Cap Horn, p. 17, t. 6, f. 7.

Unfigured species.

Patula (Discus) brunnescens v. Mlldff. Tenimber Is. (Timorlaut). Nachr.-Bl. D. M. Ges. 1892, p. 87.

Patula digonophora Ancey. Oahu. Bull. Soc. Mal. Fr. 1889, p. 171.

Patula glissoni Ancey. Vate, New Hebrides. Le Naturaliste, Feb., 1889, p. 50. Probably a *Charopa.*

Patula monstrosa Ancey. Viti-Levu, Vitian Archipelago. Le Naturaliste, 1889, p. 71. (=*P. irregularis* Mouss., in Mus. Godeffroy, and *P. irregularis* Garrett, in Proc. Zool. Soc. Lond. 1887, not *Pat. irregularis* C. Semper, *teste* Ancey). Probably a Charopa.

Patula pallens Gredler. Nachr. Bl. D. M. Ges. 1890, p. 35. Patong, southwest Hupé, China.

Subgenus Endodonta Alb., (Vol. III, p. 59.)

Mr. Tryon has included *Pitys* Pse. (not Beck) in *Endodonta*, on account of the difficulty of distinguishing the two groups. There can be no doubt that the distinction is rather shadowy, but not more so than the differences between *Pitys* (Pse.) and *Charopa*. The supply of names is largely in excess of the natural divisions in this case. It is not improbable that under the head Endodonta might be included these sections:—*Simplicaria* Mouss., *Pitys* Pse. not Beck, *Maoriana* Sut., *Endodonta* Alb., *Diaglyptus* Pils., *Libera* Garr., *Helenoconcha* Pils. It is probably that *Charopa* and *Æschrodomus* should also be inserted, in which case they would stand at the head of the preceding list.

P. philippinensis Semper. Pl. 37, figs. 38, 39, 40.

Shell minute, of an earthy brown color, discoidal, deeply and broadly umbilicated, the umbilicus one-third the diameter of the shell. Spire low-convex, very obtuse, whorls 3½, the earlier 1⅓ very

delicately but sharply and distinctly spirally striated; the remaining whorls crossed by delicate but sharp radiating riblets, which at the periphery of the last whorl number about 3½ in the space of the tenth of a millimeter. Last whorl rounded, scarcely descending in front. Aperture round-lunar, oblique, having one strong entering lamella on the parietal wall, one at the base of the columella, and two dentiform plicæ within the outer lip.

Alt. 0·75, diam, 1·5 mill.

Antipolo Mts. and Montalban near Manila, Luzon; Zebu on the higher Mts.; Banda Is.; Sirisori, on the island of Saparua.

Endodonta philippinensis Semp., Reis. d. Philippinen, p. 140.—v. Mœll. Jahrb. d. D. Mal. Ges. xiv, p. 272, 1887; and Ber. Senck. Nat. Ges. 1890, p. 221.—*Endodonta philippinica* Boettger, Ber. Senck. Nat. Ges. 1891, p. 263.

Semper's description is very poor. The above description and the figures are drawn from Luzon examples kindly transmitted to me by Dr. von Moellendorff. The outer lip-tooth is situated somewhat higher in some examples. The specimen reported by Boettger from Banda Is. measures, alt. ⅔, diam. 1⅝ mill., and differs from Cebu examples in having the periphery of the last whorl somewhat flatter, and the three palatal teeth rather stronger. Two young specimens from Sirisori had the teeth not yet formed, and were a little higher, with the umbilicus somewhat less wide.

P. fuscozonata Beddome. Pl. 30, figs. 39, 40, 41, 42.

Shell convex, depressed, thin, pale yellowish-brown transversely banded with fuscous bars; spire scarcely raised, obtuse; whorls 6, furnished with rather prominent, close, transverse, oblique striations, the suture convex and considerably raised; the last whorl rather sharply angled at the periphery; umbilicus small but distinct; aperture lunate; peristome simple, thin; three elongated lamellæ on the parietal wall, which run some way into the shell, two prominent but rather shorter ones opposite on the outer wall, near the umbilicus and one or two subobsolete ones just beyond these. *(Bedd.)*

Diam. 3½, height 2½ mill.

Koror, Pelew Group.

H. (Endodonta) fuscozonata Bedd., P. Z. S. 1889, p. 116, t. 12, f. 12.

Nearest to *H. constricta* Semper, but differs considerably in its prominent striation, sharply angled periphery, and raised sutures.

P. KORORENSIS Beddome. Pl. 30, figs. 43, 44, 45.

Shell very narrowly umbilicate, thin, somewhat discoid; spire depressed; color light brown, blotched with a darker shade, transversely decussated with about 23 revolving, prominent, thin, wavy ribs, otherwise smooth; whorls 5, convex; peristome thin; aperture lunar circular, furnished with 4 narrow lamellæ on the parietal wall and 9 on the opposite exterior wall, all of which run into the shell parallel with the whorl about 4 mill. (*Bedd.*)

Diam. 5½–6, height 4 mill.

Koror, Pelew Group.

H. (*Endodonta*) *kororensis* BEDD., P. Z. S. 1889, p. 116, t. 12, f. 11.

P. TIMANDRA Hutton. Pl. 24, fig. 21, 22, 23.

Shell small, disk-shaped, the spire flat, inner whorls a trifle sunken; umbilicus broad and shallow; periphery rounded; color, rich brown, with flames or ⋎-shaped stripes of whitish. Surface sculptured with rather separated riblets, which are sinuous above, nearly straight beneath.

Whorls 4½, slowly increasing. Aperture slightly oblique, roundly-lunar; peristome thin, simple, the margins converging, forming about three-fourths of a circle. Parietal wall bearing an entering stout lamella; basal and outer walls each having a short fold, sometimes absent. Alt. 1, diam. 3 mill.

Auckland, New Zealand.

Patula timandra HUTT., Trans. N. Z. Inst. xvi, p. 175, 192.—*Patula varicosa* SUTER, Tr. N. Z. I. 1891, p. 293, t. 22, f. 28, 29 (jaw and teeth, the latter figured from an abnormal specimen, *teste* Suter.)

This has been said to be a synonym of the *Patula varicosa* of Pfeiffer (Manual III, p. 23) but it is not that species.

The latter half of the last whorl is depressed below the level of the preceding whorl, but the inner whorls are slightly concave. The teeth are deeply placed within the aperture, and would escape notice unless carefully looked for. The parietal fold seems to be the most constant, being present in young shells. The riblets are markedly sinuous above, and they become subobsolete on the base, increasing a little again as they pass into the wide umbilicus. At the periphery there are five riblets to a millimeter. The following

species differs in the greater number of teeth and the much finer striation.

This species, with the next two, forms a group intermediate between the toothed *Endodonta* and the toothless *Charopa*.

P. JESSICA Hutton. Pl. 24, figs. 24, 25, 26, 27.

Shell small, discoidal, widely umbilicated, ribbed; color horny, largely radiately streaked and clouded with reddish-brown, giving a general dark color to the shell. Spire flat or slightly convex, apex often pushed in; whorls 4½ to 5½, very slowly increasing, rounded, with numerous rather close ribs, which are strongly sinuated on the upper surface, but straight and feebler below; ribs about 36 in the tenth of an inch, the interstices strongly striated with growth-lines, and more or less reticulated with spirals; suture impressed; umbilicus wide, perspective, showing all the whorls; aperture nearly vertical, rotundly lunar; peristome thin, flatly angled above, then regularly arched, the margins at right angles.

Greatest diameter ·17, least ·15, alt. ·08 inch. (*Hutton.*)

Bealey, Canterbury, New Zealand.

Patula jessica HUTTON, Tr. N. Z. Inst. xvi, p. 174.

P. CRYPTOBIDENS Suter. Pl. 24, figs. 28, 29, 30, 31.

Shell very minute, discoidal, umbilicated, cinereous, not shining, very fragile, subtransparent, with very fine and extremely close-set ribs, which are slightly bent forward, but almost straight on the upper surface, and rather sinuated at the periphery, about 85 to 90 in the tenth of an inch (35 per mm.). Spire flat. Whorls 4½, narrow, rounded, regularly increasing, the last not descending. Suture deep, aperture rotundly lunate, subvertical, slightly excavated by the penultimate whorl. Peristome acute, somewhat flattened at the base, the upper margin advancing. Interior of the aperture with two teeth. There is a callosity on the basal margin, from which to the left rises a stout conical tooth; another tooth of the same shape is near the middle of the parietal wall. Both teeth are at some distance from the margin. Columellar margin short, arcuated, slightly reflected. Umbilicus broad, perspective, showing all the whorls, about one-third of the diameter. (*Suter.*)

Alt. 0·75, diam. 1·75 mill.

White Horse Hill, Hooker Valley, South I., New Zealand, among mould in the subalpine bush.

Pitys cryptobidens SUT., Tr. N. Z. Inst. 1890, p. 89, t. 17, f. 7*a-c*, (shell), M, N (jaw and dentition.)

Owing to the very poor condition of the radula first examined by Mr. Suter, he considered the teeth zonitoid. This was a mistake, as he subsequently discovered; the dentition being similiar to *Patula*.

Section DIAGLYPTUS Pilsbry.

Pitys BECK, Index Molluscorum p. 9, 1837 (name only), type *P. oparana* B. (undescribed).—MŒRCH, Catal. Yoldi, p. 6, 1852 (no description; *H. bilamellata* Pfr. mentioned.)

Not *Pitys* PEASE, P. Z. S. 1871, p. 450.

Shell elevated-trochiform, umbilicated, *the two apical whorls spirally striated* the remaining whorls strongly ribbed. Aperture armed with a strong entering parietal lamella and two close columellar plicæ; *peristome expanded; columella callously thickened within*, ending below in a callous nodule. Type *Helix bilamellata* Pfr.

This section differs from LAOMA (type *H. leimonias*) in having the apical whorls spirally striated, the columella strongly calloused within, and the peristome expanded. The anatomy is unknown, but it probably resembles *Endodonta* rather than *Laoma*.

There can be little doubt that Beck's subgenus *Pitys* was founded for the species cited below; but as not a line of description of either the subgenus or the species named by Beck was ever given, we cannot accept the name, the identification of which rests wholly upon its *etymology*. Pease confused Beck's *P. oparana* with Anton's *H. opanica*, and accepting the latter as Beck's type, proceeded to define the group; but since *Pitys* Pease is demonstrably different from *Pitys* Beck, we are compelled to reject his revival of the name. I have given a new name to the present group in order to avoid the confusion incident upon the employment of the name *Pitys* in a sense new to modern conchologists. It cannot be contended that *Pitys* should be retained for the group, because no description has ever been given except that of Pease. *Pitys* will therefore be dropped entirely from nomenclature.

P. BILAMELLATA Pfr. (MANUAL iii, p. 68). Mr. E. A. Smith has changed the name to *Patula pagodiformis* because *bilamellata* is preoccupied for a species from St. Helena. See P. Z. S. 1892, p. 262. In case a change is necessary it might have been well to revive the name *oparana* Beck.

Section MAORIANA Suter.

Strobila HUTTON, Trans. N. Z. Inst. xvi, p. 195, 1884, not *Strobila* MORSE.—*Huttonella* SUTER, Trans. N. Z. Inst. xxii, p. 224, 1889, not *Huttonella* Pfr.—*Maoriana* SUTER, *l. c.* xxiii, p. 96, 1890.

A single species of this interesting group of Endodontoid snails was known at the time Mr. Tryon published the account of *Strobila* in the MANUAL, and that species was unfigured. I am indebted to Mr. Suter for specimens of several species and figures of the others. Either "Maoria" or "Maorina" would have been better names, the termination used by Mr. Suter having an objectionable adjective form.

The group is not of generic value, as New Zealand authors have supposed. It is simply a moderately well defined section of *Endodonta*.

P. LEIODA Hutton. Pl. 24, figs. 32, 33, 34, 35.

Shell minute, subdiscoidal, umbilicated, ribbed; color horny with longitudinal bands of pale rufous. Spire almost flat, but very slightly convex; whorls five, very slowly increasing, rounded, with numerous oblique narrow ribs, about thirty in the tenth of an inch, the interstices finely striated with growth-lines; suture impressed; umbilicus rather narrow, about one-sixth the diameter of the shell, nearly cylindrical, margined with brown; aperture vertical, rather narrow, lunate; peristome simple, thin, the right lip at first ascending, then descending and sweeping forward, leaving a shallow posterior sinus, afterwards regularly arched, columellar margin shortly ascending, rather straight, and slightly reflected over the umbilicus; interior of the aperture strengthened with seven spiral plaits on the body-whorl, and another, rather distant, on the columella; parietal wall with ten spiral plaits.

Greatest diameter 0·08, least 0·07; height 0·05.

Animal.—Body elongated, narrow; eye peduncles long and thick, tentacles moderate; mantle subcentral, rather anterior, enclosed; foot very long and narrow, with neither locomotive disc nor caudal gland. Color pale grey, eye peduncles and a stripe on each side of the head purplish; foot pale brown. Dentition, 12-1-12. (*Hutt.*)

Greymouth, South I., New Zealand.

Strobila leiodus HUTTON, Trans. N. Z. Inst. xv, 1882, p. 135.—*S. leioda* HUTTON, *l. c.* xvi, p. 166, 195, t. 9, f. P (dentition.)

The figures of this species, as well as of the others, were drawn by Mr. Suter from the type specimens.

P. WAIRARAPA Suter. Pl. 24, figs. 36, 37, 38, 39.

Shell depressed, small, light horny-brown with brown streaks, which are irregular in breadth, faintly shining, fragile, with close and fine ribs, which are somewhat undulating. Ribs about 38 in the tenth of an inch (15 per mill.). Spire little elevated, nearly flat. Whorls 6, slowly increasing, narrow, the last not descending, rounded. Suture deeply impressed. Aperture slightly oblique, lunately rounded, considerably excavated by the penultimate whorl. Peristome straight not dilated, acute, margins slightly convergent. Columellar margin not reflected, descending. Aperture with 16 laminæ—5 on the penultimate whorl, 1 on the columella, and 10 on the palatal wall. Of the laminæ on the penultimate whorl the four inferiors are close together, the superior at some distance, all showing the same development. The lamina on the columella is more developed, conical. The laminæ on the palatal wall are fine, long and nearly regularly distributed over the whole surface. Umbilicus wide, perspective, deep, one-third of the diameter.

Alt. 0·4, diam. 1·75 mill. (*Suter.*)

Hastwell, Forty mile Bush, North I., New Zealand, under rotten bark in the bush.

Helix wairarapa SUTER, Trans. N. Z. Inst. xxii, p. 222, t. 14, f. 2*a-c*. 1889.—*Maoriana wairarapa* SUTER, *l. c.* 1891, p. 298, t. 23 f. 45 (dentition.)

P. PSEUDOLEIODA Suter. Pl. 24, figs. 40, 41, 42, 43.

Shell small, globose, yellowish-white, banded with somewhat backwards directed brown streaks, faintly shining, closely ribbed, ribs on upper surface straight, a little undulating outside; ribs about 38 in the tenth of an inch (15 per mm.). Spire globosely elevated, less rounded at the base. Whorls 6, round, very slowly increasing, the last not descending. Suture pretty deep. Aperture lunately rounded, slightly oblique, excavated by the penultimate whorl. Peristome straight, not dilated, acute, margins distant, columellar margin slightly descending. Aperture with 12 laminæ—3 on the penultimate whorl, 1 on the columella, and 8 on the palatal wall.

The lowest plait on the penultimate whorl is strongly developed; the plait on the columella also is relatively large, tongue-shaped; the laminæ on the palatal wall are fine, long, the four lower ones

are more approached than the others. Umbilicus very narrow, deep, open. Alt. 1·5, diam. 2·25 mill. (*Suter.*)

Hastwell and Mauriceville, Forty-mile Bush, North I., New Zealand; under rotten wood and bark in the bush.

Helix pseudoleioda SUTER, Tr. N. Z. I. xxii, p. 221, t. 14, f. 1*a-c.* —*Maoriana pseudoleioda* SUT., *l. c.* 1891, p. 298, p. 298, t. 23, f. 43, 44 (jaw and dentition.)

Like *P. leioda* externally, but having only 12 lamellæ in the aperture.

P. HECTORI Suter. Pl. 24, figs. 44, 45, 46, 47.

Shell small, depressed, discoidal, light horny-brown with large close brown streaks, not shining, fragile, transparent, closely ribbed, ribs nearly straight, about 38 in the tenth of an inch (15 per mm.). Spire nearly flat. Apex bare of epidermis, light-grey. Whorls 5, very slowly but regularly increasing, rounded, the last not descending. Suture impressed. Aperture slightly oblique, rotundly lunar, excavated by the penultimate whorl. Peristome acute, straight, margins convergent. Columellar margin not reflected, descending. Aperture with 14 laminæ—5 on the penultimate whorl, 2 on the columella and 7 on the palatal wall. On the middle of the penultimate whorl is a stout lamina, which is divided in two by a deep groove, thus getting forked; the other four smaller laminæ are below this one. The laminæ on the columella are well developed, the inner one with two or three sharp points, the second high, in the shape of a sharp tooth. The plaits on the palatal wall are rather stout, elevated, not very long, and regularly distributed. Umbilicus broad, deep, perspective, nearly one-third of the diameter.

Alt. 1 to 1¼, diam. 2¼ mill. (*Suter.*)

Hastwell, North I., New Zealand; under rotten bark in the bush.

Helix hectori SUT., Tr. N. Z. I. xxii, p. 222, t. 14, f. 3*a-c.*—*Maoriana hectori* SUT., *l. c.* 1891, p. 299, t. 23, f. 46, 47 (jaw and dentition.)

P. MICROUNDULATA Suter. Pl. 24, figs. 52, 53, 54, 55, 56.

Shell depressed, very small, pale horny, with neat brown streaks which are sometimes sharply undulating, or else forming zigzag lines, but varying in breadth; faintly shining, fragile with very close ribs. Ribs bent a little forward on the surface, then going straight downward—60 in the tenth of an inch (25 per mill.).

Spire very little elevated, nearly flat; apex bare. Whorls 5, slowly increasing, rounded, the last not descending. Suture impressed. Aperture slightly oblique, rotundly lunar, more excavated in the upper part by the penultimate whorl. Peristome straight, acute, margins not convergent, regularly arched, columellar margin descending. Aperture with 13 laminæ—1 on the penultimate whorl, 2 on the columella, and 10 on the palatal wall. The plait on the penultimate whorl is central, high, but rather thin, forked at the top by a deep and large groove. The two laminæ on the columella are stout, with large base, and both tongue-shaped. The plaits on the palatal wall are fine, long, regularly distributed. Umbilicus deep, broad, nearly one-third of the diameter.

Alt. 1, diam. 1·75 mill. (*Suter.*)

North Island, N. Z., at Hastwell, under rotten wood and bark; *also at Greymouth.*

H. microundulata SUTER, Tr. N. Z. Inst. 1889, p. 223, t. 14, f. 4*a-d.*—*Maoriana microundulata* SUT., *l. c.* 1891, p. 299, t. 23, f. 49, 50 (jaw and dentition.)

P. AORANGI Suter. Pl. 24, figs. 48, 49, 50, 51.

Shell small, depressed, globular, yellowish-white, with somewhat irregular chestnut zig-zag or sinuated streaks, faintly shining, thin, transparent. With well developed ribs, nearly straight, about 38 in the tenth of an inch (15 per mill.). Whorls 5½ to 5, slowly increasing, rounded. Suture impressed. Aperture slightly oblique, rotundly lunar, regularly excavated by the penultimate whorl. The last whorl not descending. Aperture straight, acute, margins slightly convergent; columellar margin descending, not reflected. Aperture with 12 laminæ—1 on the penultimate whorl, 2 on the columella, and 9 on the palatal wall. The lamina on the penultimate whorl is a little above the centre, high, rather thin, and forked by a deep and broad groove. The two laminæ on the columella are stout, with large base, and tongue shaped, the first rather sharp. The nine lamellæ on the palatal wall are fine and long—the five lower ones a little stouter, and separated from the four upper by a somewhat larger interval. Umbilicus deep, perspective, not very broad, about one-quarter of the diameter.

Alt. 1·25, diam. 2 mill. (*Suter.*)

South Island, N. Z. at Hooker Valley; environs of the Mount Cook Hermitage.

H. aorangi SUTER, Tr. N. Z. I. 1889, p. 223, t. 14, f. 5*a-c*.—*Maoriana aorangi* SUT., *l. c.* 1891, p. 300, t. 23, f. 51, 52 (jaw and dentition.)

Closely allied to *M. microundulata*, but larger, more globose, with stronger, more distant ribs. The laminæ of the aperture are nearly equal in the two species, but *M. aorangi* has only nine lamellæ upon the palatal wall.

Section HELENOCONCHA Pilsbry.

P. BILAMELLATA Sowerby. Pl. 36, fig. 12.

Shell orbiculate depressed, the spire flat; whorls 7, the last swollen below, angular above. Umbilicus small. Aperture semilunar, angulated at the upper outer part, the outer lip thin; inner lip bearing two spiral folds, the posterior one larger.

Alt. 3¾, diam. 8¼ mill. (*Sowb.*)

Between Jamestown and Longwood, along the path, and at the *north end of the island, St. Helena.*

H. bilamellata G. SOWERBY, append. to Darwin's Geol. Obs. on Volcanic Is., p. 157.—FORBES, Journ. Geol. Soc. Lond. viii, p. 199, t. 5, f. 8 (1852).—*Patula bilamellata* WOLLASTON, Test. Atlant., p. 537.—*Patula bilamellata var. unilamellata* SMITH, P. Z. S. 1892, p. 262, t. 21, f. 5.—(Not *H. bilamellata* PFR., Zeitschr. f. Mal. 1845, p. 84; Conchyl. Cab., t. 101, f. 16–18; Monographia i, p. 188.)

The spire is flat, and marked with irregular reddish rays.

Var. *unilamellata* Smith. Aperture with the lower parietal lamella wanting.

Sugarloaf Ridge, St. Helena.

P. VERNONI Smith. Pl. 36, figs. 13, 14, 15.

Shell narrowly perforated, depressed discoidal, flattened above, acutely carinated at the periphery, white, radiated with rufous above and beneath; whorls 6, slowly increasing, slightly convex, striated with delicate growth-lines; the last whorl acutely carinated, slightly compressed above and below the carina, hardly descending in front, painted below with undulating rufous rays, delicately radiately striated. Aperture small, subrhomboidal, provided with a delicate entering parietal lira; peristome simple, thin, slightly thickened toward the umbilicus.

Alt. 4, greater diam. 12, lesser 11 mill. (*Sm.*)

Side Path, St. Helena (extinct.)

Patula (Endodonta) vernoni SMITH, P. Z. S. 1892, p. 262, t. 21, f. 6–6*b*.

This species is at once recognized by its very flat spire, the compressed very acute keel, the minute umbilicus, the single fine liration upon the upper part of the body-whorl, running within the aperture, and the style of coloring. The red rays upon both the upper and lower surfaces are more or less wavy and interrupted. There is no other sculpture excepting the fine lines of growth which cross the upper surface of the whorls obliquely and are a little flexuous beneath. The body-whorl has a more distinct impression below the keel than above it. I have much pleasure in naming this very distinct species after my late friend, T. Vernon Wollaston, whose work Testacea Atlantica is one of the most accurate and complete hitherto published upon any Molluscan fauna. (*Smith.*)

P. BIPLICATA Sowerby. *Unfigured.*

Shell orbiculate-depressed; whorls 5, rounded, striated. Aperture semilunar; parietal wall having two spiral folds, the upper one larger. Umbilicus large. Alt. 1, diam. 2½ mill. (*Sowb.*)

Northern part of St. Helena.

Helix biplicata SOWB. in appendix to Darwin's Geol. Obs. on the Volcanic Is. visited during the Voy. H. M. S. 'Beagle,' p. 158 (1844).—*Patula biplicata* WOLLASTON, Test. Atlant., p. 538.

This species has been found only in a subfossil condition. It differs from *H. bilamellata* in the larger umbilicus, more exserted spire, and the rounded, *not carinated* whorls.

P. PSEUSTES Smith. Pl. 36, figs. 16, 17, 18.

Shell conoid, pyramidal, narrowly umbilicated; whitish, painted above with square spots, below with flames of reddish; whorls 6½, convex, separated by a deep suture, radially delicately costulate, the last whorl rounded at the periphery, sculptured beneath with very delicate flexuous striæ; aperture lunate, oblique, having six unequal denticles within (2 lamelliform, on parietal wall, 3 smaller on the columella, and 1 in the middle of the palate); peristome thin, margins remote, the columella slightly dilated.

Alt. 2⅔, diam. 3⅓ mill. (*Smith.*)

Flagstaff Hill, St. Helena (extinct.)

Patula (Endodonta) pseustes SM., P. Z. S. 1892, p. 262, t. 21, f. 7–7*b*.

This species has the spire more elevated and conical than the other species of *Patula* from the island. *P. cutteri* Pfr. may approach it somewhat, but that species is said to have only two parietal lamellæ, and two basal denticles near the columella. The present species has an additional basal denticle, and a prominent thin palatal lamella, which falls as it were between the two on the inner or parietal side of the aperture. (*Smith.*)

P. CUTTERI Pfr. *Unfigured.*

Shell perforate, conoid-depressed, thin, rather closely chordate-costate, scarcely shining, chestnut colored, tessellated with buff above, obsoletely undulately streaked below; spire shortly conoid, vertex minute. Whorls 5½, convex, the last not descending, the base a little convex. Aperture slightly oblique, lunar, having two acute entering parietal laminæ, and two dentiform basal ones, at the columella; peristome simple, straight, margins remote, the columellar margin slightly dilated above.

Alt. 2·5, diam. 4·75 mill. (*Pfr.*)

Diana's Peak, St. Helena (living).

H. cutteri PFR., Mal. Bl. 1856, p. 206; Monogr. iv, p. 155.—*Patula* (*Endodonta*) *cutteri* SMITH, P. Z. S. 1892, p. 263.

A small species, unknown to me, apparently similar in general features to the preceding, but with only four teeth within the aperture, two parietal and two basal near the columella, more narrowly umbilicated and probably more strongly sculptured. (*Sm.*)

P. POLYODON Sowerby. Pl. 36, figs. 19, 20, 21, 22.

See MANUAL III, p. 62. Smith writes as follows: This is the most widely umbilicated of all the species of *Patula* from St. Helena, and this feature alone is sufficient to distinguish it from the rest. The whorls also, in adult shells eight to nine in number, enlarge very slowly. The striæ are fine, regular, arcuately oblique above, and slightly wavy on the last whorl. There are three parietal liræ extending far within the aperture, of which the upper and lower are nearly always double. The plicæ within the outer lip are almost invariably (in adult shells) seven in number, subequidistant, but not of equal thickness, two or three towards the columella being stouter than the rest, which are slender and extend some distance within. Diam. maj. 5¼ mill., min. 5, alt. 2½.

Side Path, Sugarloaf Quarry, Sugarloaf Ridge, St. Helena (extinct.)

The species to which the foregoing remarks apply is certainly the *Helix alexandri* of Forbes, for in the British Museum there are specimens of it presented by Mr. Alexander, who also furnished Forbes with the shells he described. Moreover the description is fairly applicable, especially that portion of it referring to the umbilicus, which is described as "maximus." It is much less certain that this is the *H. polyodon* of Sowerby, but as Mr. Wollaston has united these species as well as *H. helenensis* (Forbes) Pfeiffer, it will probably be advisable to acquiesce in this decision. There are however, certain differences in the descriptions, which seem to indicate that more than one species was described by these authors, for instance: —*H. polyodon* is said to consist of six striated whorls, with three parietal and five palatal liræ, and a moderate sized umbilicus, whereas *H. alexandri* is described as having seven strongly striated whorls, three parietal and eight palatal liræ, and a very large umbilicus. *H. helenensis* is characterized as possessing eight very narrow closely costate whorls, and only two parietal liræ and the same number within the outer lip. Pfeiffer states that *H. helenensis* was described by Forbes in the Proc. Zool. Soc. for 1851, and this statement is copied both by Reeve and Wollaston. This appears to be an error, for after a careful search, I have been unable to discover in any publication the description by Forbes of any species of *Helix* under that name. (*Smith.*)

P. MINUTISSIMA Smith. Pl. 36, figs. 23, 24, 25, 26.

Shell conoid-depressed, moderately widely umbilicated, maculated and variegated with white and reddish; spire slightly elevated, obtuse above; whorls 7, the earlier two smooth, pale rufescent, the rest slightly convex, ornamented with delicate, oblique, arcuate lirulæ, flexuous on the last whorl, which is rounded or sometimes obsoletely angled at the periphery, hardly descending in front. Aperture oblique, semi-lunate; parietal lamellæ 6 in mature, 4 or 5 in younger shells; palatal plicæ 8–10; peristome thin, columellar margin expanded. Alt. 2¼, greater diam. 4¾, lesser 4½ mill. (*Sm.*)

Sugarloaf Ridge, St. Helena (extinct).

Patula (*Endodonta*) *minutissima* SMITH, P. Z. S. 1892, p. 264, t. 21, f. 9–9*c*.

This species is smaller than *P. polyodon*, more narrowly umbilicated, has fewer whorls, coarser and more remote striæ, and a different armature within the aperture. In full-grown shells there are

as many as six parietal liræ, as it were, in two groups of three. They are very fine and extend a long way within. The plicæ within the outer lip vary apparently from seven or eight to ten or eleven, and some of them are more prominent than others. The red markings take the form of radiating blotches on the upper surface; and more undulating or zigzag streaks beneath. (*Sm.*)

P. LEPTALEA Smith. Pl. 36, figs. 27, 28, 29, 30.

Shell orbicular, depressed, broadly umbilicated; whitish, variegated with rufous; spire slightly elevated; whorls 5, the first 1½ smooth, the rest slightly convex, very delicately arcuately striated, slowly increasing; the last whorl rounded at the periphery, hardly descending in front; aperture oblique, semi-lunate; parietal lamellæ 3 (the upper and middle ones double), thin, deeply entering; palatal plicæ about 6. Alt. 1⅓, greater diam. 3¼, lesser 3 mill. (*Smith.*)

Sugarloaf Quarry, St. Helena (extinct).

Patula leptalea SM., P. Z. S. 1892, p. 264, t. 21, f. 10–10*c*.

This species is much smaller than *P. polyodon* and not quite so large as *P. minutissima*; it is flatter than either, much more finely striated than the latter and has a different oral armature from both. The parietal liræ are unequal in size, that nearest the columella being the smallest. The two others are about equal and double, and between, occasionally, a very small and slender intermediate lira is observable. (*Sm.*)

Unfigured species of Pitys and Endodonta.

Pitys elisæ Ancey. Sandwich Is? Bull. Soc. Mal. Fr. 1889, p. 180.

Pitys hamyana Ancey. Gambier Is. Le Naturaliste, 1889, p. 84.

Endodonta apiculata Ancey. Kaui, Sandwich Is. Bull. Soc. Mal. Fr. 1889, p. 188.

Endodonta garretti Ancey. Society Is. Le Naturaliste, 1889, p. 118.

Pitys woapoensis Garrett. Bull. Soc. Mal. Fr. iv, p. 17, 1887. Island of Woapo, Marquesas.

Pitys octolamellata Garrett., *t. c.*, p. 18. Dominique, Marquesas Is.

Pitys marquesana Garrett., *t. c.*, p. 18. Nuka-Hiva, Marquesas Is.

Pitys anceyana Garrett., *t. c.*, p. 19. Dominique, Marquesas Is.

Section CHAROPA Albers, 1860.

The type of *Charopa* being *H. coma* Gray, it becomes necessary, as Suter has shown, to use that name in a subgeneric sense, for the Australo-Oceanic Patulæ, which, although similar enough in general appearance to the smaller species of *Patula* the world over, still possess a few characters worthy of note. The spire has a tendency to become flattened, or sometimes even concave, quite as in *Diplomphalus;* and the upper termination of the peristome recedes more or less, forming a notch or sinus at the superior angle of the mouth. These characters, although of no very great importance, and varying greatly in degree of development in the different species, may still be held sufficient to justify the separation of *Charopa* as a section of *Patula*, pending the examination of the soft parts of the animal. The separation of *Charopa* from *Pitys* and the allied forms with toothed apertures, is at present artificial, and founded wholly upon the presence or absence of teeth or folds within the aperture.

The figured species have been described by Tryon in vol. III, p. 22, 23, 24. The following were not included there:

(1. *Species of New Zealand.*)

P. COMA Gray. Vol. IX, Pl. 4, figs. 1, 2, 3.

See vol. III, p. 22.

Var. *globosa* Suter. Has the general appearance of *P. lucetta*, but the umbilicus is wider and the ribs more distant.

Alt. ·16 inch.

Near Hastwell, N. Island, N. Z.

P. LUCETTA Hutton (Vol. III, p. 22). *P. stokesii* E. A. Smith is a synonym according to Mr. Suter.

P. ETA Pfr. (III, p. 24.) Var. *maculata* Suter.

Shell agrees in almost every respect with the type of the species, but the white epidermis is adorned with rufous radiate streaks at very irregular distances and from narrow to broad. There are about 50 ribs in the tenth of an inch (20 per mm.) whilst the species, according to Professor Hutton, has only 40; but I do not think this

to be of much value for distinguishing the variety. According to my observations, *P. cornicalum* varies considerably in the number of the ribs in different localities. I collected specimens in the Forty mile Bush with about 50 ribs in the tenth of an inch, and near Wellington with less than 40. Diam. 2·75, height 1·5 mill.

(*Suter*, in Trans. N. Z. Inst. 1890, p. 89.)

Foot of Sealy Range, Hooker Valley, South Island, N. Z.

P. BIANCA Hutton. Pl. 37, figs. 41, 42.

Shell minute, discoidal, widely umbilicated, finely ribbed; color horny brown, banded with darker. Spire flat, or slightly convex; whorls 4, slowly increasing, rounded, delicately ribbed; ribs about 55 in the tenth of an inch, the interstices striated; suture impressed, umbilicus broad, gradated; aperture slightly oblique, rotundly lunar; peristome thin, regularly arched; greatest diameter ·1, least ·09 inch. (*Hutt.*)

New Zealand: North Island at Auckland, Horokiwi, Wellington and Hastwell; S. Isl. at Greymouth, Bealey and Hooker Valley.

P. bianca HUTT., Trans. N. Z. Inst. xvi, p. 175, 192.—SUTER. Trans. xxiv, p. 273, 276, 292, t. 21, f. 20, 21 (jaw and dentition), *P. bianca var. montana* SUTER, Trans. xxiii, p. 88, t. 17, f. K, L (jaw and dentition).

Var. MONTANA Suter. Shell larger, darker colored without streaks, the ribs coarser and more distant, about 35 in the tenth of an inch, or 14 per mill. Alt. 1¼, diam. 2¾ mill.

White Horse Hill, Hooker Valley, S. Island, N. Z.; under dead leaves and rotten wood in the subalpine bush.

P. bianca is also found in the same locality, but rather scantily, and differing from the type in being never over 2 mill. diam., by having 4 whorls, and by the ribs being more distant, about 50 instead of 55 in the tenth of an inch. (*Suter.*)

P. TAPIRINA Hutton. Vol. IX, Pl. 4, figs. 4, 5, 6.

Shell subdiscoidal, broadly umbilicated, closely ribbed; color horny brown, sub-radiated with reddish spots. Spire very slightly elevated, flat; whorls 5½–6, slowly increasing, rounded, ornamented with narrow oblique ribs, about 16–20 in the tenth of an inch, the interstices indistinctly striated with growth lines; suture impressed; umbilicus about one-fourth the diameter of the shell, funnel-shaped, gradated, pervious; aperture subvertical, rotundly lunar; peristome

thin, upper margin rapidly advancing and then turning down with a slightly concave sinuation, then regularly arched; columellar margin not reflected. Greatest diameter 0·19, least 0·16, height 0·07 inch. Dentition 13–1–13. (*Hutton.*)

Having compared this species with specimens of the true *P. coma* from Auckland, I find that it is different, being more closely ribbed, but less closely so than in *P. buccinella* and *P. infecta*. The right lip advances as in *P. infecta*, but it can be distinguished from that species by the interstices between the ribs appearing almost smooth when viewed by transmitted light, and an inch objective. (*Hutton.*)

North Island of New Zealand at Auckland, Hastwell, Hawke's Bay, Masterton and Wellington; South Island at Greymouth, Temuka, Dunedin and Queenstown.

Patula coma HUTT., Tr. N. Z. I., xiv, p. 130, t. 3, f. L, not of Gray.—*Patula tapirina* HUTT., *ibid.* xv, p. 134, and xvi, p. 193.—*P. tapirina f. albina* SUTER, ibid. xxiv, p. 273.

P. SYLVIA Hutton.

Shell minute, discoidal, umbilicated, obliquely ribbed; colors very pale horny with faint thin radiating bands of chestnut on the upper surface. Spire flat or slightly convex; whorls 5½, very slowly increasing, rounded, with delicate rather distant ribs which are very oblique on the upper surface but transverse to the whorls on the lower surface, ribs about 18 in the tenth of an inch, the interstices rather strongly striated with growth lines; suture impressed; umbilicus rather wide, graduated; aperture slightly oblique, rotundly lunar; peristome thin, regularly arched, the upper margin advancing.

Greatest diameter ·12; least ·1; height ·06 inch. (*Hutton.*)

Auckland, Horokiwi, Forty-mile Bush, and Wellington, North I., Bealey, S. Isl., New Zealand.

P. sylvia HUTTON, Trans. N. Z. Inst. xvi, p. 175, 193.—SUTER, Ibid. xxiv, p. 273, 278; 1891.

Mr. Suter (*in lit.*) informs me that this is identical with *P. tau* Pfr.

P. ZETA Pfr. (III, p. 23.)

Var. IRREGULARIS Suter. Pl. 19, figs. 13, 14, 15.

Shell depressed, subdiscoidal, yellowish-white, with distant light brown streaks vanishing on the base, slightly shining, rather thin,

transparent; strongly plaited, plaits directed forwards on the upper surface, and a little undulated, descending; about 30 in the tenth of an inch (12 per mm.). The ribs are irregularly developed and distant. Spire slightly elevated. Whorls 5 to 5½, narrowly rolled up, very slowly increasing, rounded, the last very slightly descending. Suture not deep; aperture rotundly lunar, but little excavated by the penultimate whorl, slightly oblique. Upper margin advancing. Margins straight, convergent, acute; columellar margin nearly vertically descending. The parietal wall inside a little callous, white. Umbilicus broad, perspective, showing all the whorls, about one-third of the diameter.

Diam. 3, height 1·5 mill. (*Suter.*)

Hastwell, Forty-mile Bush, North Island, New Zealand; under rotten logs and dead leaves. Very scarce.

This variety is distinguished from *P. infecta* by the slightly elevated spire, the faint indistinct markings; it is narrower ribbed, the ribs being irregular in distance and development; there is one-half to one whorl less, and the diameter of the shell is smaller. (*Sut.*)

Var. ALPESTRIS Suter.

The shell of this variety differs from *P. infecta* Rv. by its different color, it being cinereous-rufous with only a few pale-horny streaks. The ribs are stouter and more distant, about 18 in the tenth of an inch (7 per mill.). The whorls number only 4½ to 5; they are somewhat broader, less rounded, and the suture, in consequence, less impressed. The péristome has no callosity inside.

(*Sut.*, Tr. N. Z. Inst. 1890, p. 88.)

White Horse Hill, Hooker Valley, S. Isl., New Zealand.

P. COLENSOI Suter. Pl. 19, figs. 16, 17, 18.

Shell discoidal, yellowish-grey, zigzag streaks of dark brown flowing sometimes together, rather solid, transparent, faintly shining; with strong plaits, directed forwards on the upper surface, slightly undulating on the side; the interstices striated with growth-lines. Ribs about 20 in the tenth of an inch (8 per mm.). Spire flat. Whorls 5, narrow, slowly increasing, rounded, the last not descending, tapering. Suture deep. Aperture slightly oblique, rotundly lunar little excavated by the penultimate whorl, margins convergent. Umbilicus broad, perspective, showing all the whorls, about one-third of the diameter. Diameter, 0·16 in. (4·25 mill.); height, 0·09 in. (2·25 mill.) (*Sut.*)

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Forty mile Bush, North Island, New Zealand.

P. colensoi SUT., Trans. N. Z. Inst. xxii, p. 225, t. 14, f. 7*a*, *b*; *l. c.* xxiv, p. 293, t. 21, f. 26, 27 (jaw and dentition.)

Named in honor of the Rev. William Colenso, F. R. S., the discoverer of the *Unio waikarense.* This species is near *Pat. infecta* Reeve, but differs sufficiently from it to justify the creation of a new species; the direction of the ribs on the surface is different; there are only 5 whorls, more rapidly increasing, and the last considerably more developed; the peristome has no callosity; the umbilicus is a little narrower; the diameter is greater, the color darker, the ribs coarser and rather more distant. (*Sut.*)

P. VARIECOSTATA Suter. Pl. 19, figs. 19, 20, 21.

Shell discoidal, small, white, with large yellow streaks at regular distances, faintly shining, fragile, transparent, with close, fine ribs, directed forwards on the upper surface and going straight down on the side; there is alternately one much higher than the next; interstices striated with growth lines and reticulated with spirals. Ribs about 38 in the tenth of an inch (15 per mm.). Spire flat, only the first whorls a little elevated. Whorls 5, slowly and regularly increasing, swollen, the last not descending. Suture very deep. Aperture slightly oblique, rotundly lunar, but little excavated by the penultimate whorl. Peristome straight, acute, somewhat tapering, columellar margin nearly vertically descending, upper and lower margins strongly arcuated. Umbilicus broad, perspective, about one-third of the diameter. Alt. 1, diam. 1·8 mill. (*Suter.*)

Mauriceville, North I., New Zealand.

P. variecostata SUT., Tr. N. Z. Inst. xxii, p. 225, t. 14, f. 8.

P. RARICOSTATA Suter. Pl. 19, figs. 22, 23, 24.

Shell small, depressed, subdiscoidal, color dark olive, not shining, fragile, with distant, stout, dark brown ribs, bent backwards on the upper surface and slightly undulating on the side. Ribs about 12 in the tenth of an inch (5 per mill.). Spire slightly elevated. Apex white, bare of epidermis. Whorls 5, slowly increasing, rounded, the last not descending. Suture not deep. Aperture oblique, nearly circular, but very little excavated by the penultimate whorl. Margins convergent. Columellar margin slightly reflected, descending vertically. Lower margin strongly arcuated.

Umbilicus broad, deep, showing the last whorls, about one-quarter of the diameter. (*Suter*) Alt. 1, diam. 2 mill.

Mauriceville, North Island, New Zealand, in the mould under dead leaves; very scarce.

P. raricostata SUT., Tr. N. Z. Inst. xxii, p. 226, t. 14, f. 9.

The shell is always covered with mud.

P. MUTABILIS Suter. Pl. 19, figs. 25, 26, 27.

Shell subdiscoidal, depressed, umbilicated, white, sometimes horny, irregularly streaked with rufous, but the white form seems to be predominant; faintly shining, rather thin, transparent; with sharp, rather distant arcuated plaits, directed strongly forwards on the upper surface, slightly undulating on the side, the interstices with numerous fine growth-lines. Ribs about 13 in the tenth of an inch (5 per mm.). Spire slightly elevated, flat. Whorls 5½, narrowly rolled up, very slowly increasing, rounded, the last not descending. Suture deep. Aperture slightly oblique, rotundly-lunar, somewhat excavated by the penultimate whorl. Peristome straight, acute, tapering, columellar margin straight, not reflected. Umbilicus broad, perspective, showing all the whorls, about one-third of the diameter. Diam. 3, height 1·5 mill. (*Suter.*)

South Island, N. Z., at White Horse Hill, and foot of Sealy Range, Hooker Valley, under rotten wood, dead leaves, and in mould in the subalpine bush.

P. mutabilis SUT., Tr. N. Z. Inst. xxiii, p. 84, t. 16, f. 2, *a, b,* (shell), B, C (jaw and dentition.)

This species seems to be closely allied to *Helix eastbournensis,* Beddome and Petterd, from Tasmania, but in the latter the ribs on the upper surface are nearly straight, not arcuated; the spire is more elevated and not flat, and the umbilicus rather narrower and deeper. But there also occurs a perfectly white and a darker streaked form.

Animal:—Jaw finely striated, arcuated, not tapering, with a slight median projection.

P. STERKIANA Suter. Pl. 19, figs. 28, 29, 30.

Shell subdiscoidal, depressed, umbilicated, gray-yellowish, with very irregular rufous streaks and dots, sometimes tessellated or forming zigzag lines; not shining, rather solid, transparent; with very fine rib-like arcuated striæ, directed forwards on the upper

surface, undulating on the side and straight beneath. Ribs about 60 in the tenth of an inch (24 per mill.). Spire but little elevated, flat. Whorls 5½ to 6, slowly increasing, rounded, the last slightly descending. Suture rather deep. Aperture oblique, lunately subcircular, but little excavated by the penultimate whorl. Peristome straight, acute, tapering, margins slightly convergent, columellar margin arcuated, very little expanded. Umbilicus moderate, deep, about one-fourth of the diameter. Diam. 4, height 2 mill. (*Suter.*)

South Island, N. Z. at White Horse Hill, Hooker Valley.

P. sterkiana SUT., Tr. N. Z. Inst. 1890, xxiii, p. 85, t. 16, f. 3, *a*, *b* (shell), f. D, E (jaw and dentition).—*P. sterkiana var. reeftonensis* and *forma major* SUT., Trans. xxiv, p. 294, 295.

This species is, in the form of the shell, allied to *Patula tapirina* and *P. infecta*, but is much closer ribbed. (*Suter.*)

Forma *major*. Somewhat larger than typical *sterkiana*. Alt. 2½, diam. 4½ mill.

Owaka (*Clutha*).

Var. REEFTONENSIS Sut.

Considerably smaller, with more distant ribs, of which there are about 15 per millim.; otherwise like the type. Jaw and radula much as in the type form. At first sight this seems to be intermediate between *sterkiana* and *brouni*, but close examination shows it to be more allied to the former, though the ribs are much coarser and more distant. Alt. 1¾, diam. maj. 2¾, min. 2¼ mill.

Boatman's, near Reefton.

P. BROUNI Suter. Pl. 19, figs. 31, 32, 33.

Shell minute, subdiscoidal, umbilicated, pale-horny with rather distant dark-horny streaks, forming zig-zag lines on the periphery and beneath; not shining, thin and fragile, transparent; with very fine and close ribs, nearly straight and directed forwards on the upper surface, straight on the side and at the base; about 60 in the tenth of an inch (24 per mm.). Spire scarcely reaching above the last whorl. Whorls 5, narrowly rolled up, slowly increasing, rounded, the last not descending, suture impressed. Aperture slightly oblique, rotundly lunar, but little excavated by the penultimate whorl. Margins regularly arched, convergent, straight, acute, the outer lip slightly advancing. Columellar margin short arcuated, not reflexed. Umbilicus broad, perspective, one-third of the diameter. Diam. 2·25, alt. 1 mill. (*Suter.*)

South Island, N. Z. at White Horse Hill, Hooker Valley.

Named in honor of Captain Thomas Broun, of Karaka, Drury. This shell is closely allied to *Pat. sterkiana*, and has the same fine ribs, but may at once be distinguished from it by its smaller size, the different markings, and the somewhat different course the ribs take.

P. brouni SUT., Tr. N. Z. Inst. xxiii, p. 86, t. 16, f. 4, *a*, *b* (shell), f. F. G, (jaw and dentition.)

P. SERPENTINULA Suter. Pl. 19, figs. 34, 35, 36.

Shell small, subdiscoidal, umbilicated, pale horny, with regular streaks and dots of rufous; not shining, thin, transparent; with sharp, close-set ribs, arcuated and directed forwards on the upper surface, sinuated at the periphery and straight beneath; about 38 in the tenth of an inch (15 per mill.) Spire scarcely elevated. Whorls 5, rather narrow, regularly increasing, slightly rounded, the last not descending. Suture deep. Aperture subvertical, rotundly lunar, very little excavated by the penultimate whorl. Peristome simple, straight, the upper margin slightly advancing, margins convergent. Columellar margin short, arcuated, not reflexed. Umbilicus large, perspective, showing all the whorls, one-third of the diameter. Diam. 2·5. height 1·25 mill. (*Sut.*)

South Island, New Zealand at White Horse Hill, Hooker Valley.

P. serpentinula SUT., Tr. N. Z. Inst. xxiii, p. 87, t. 16, f. 5, *a*, *b* (shell), f. H, J (jaw and dentition).

This shell is near *Patula sterkiana* and *P. brouni*, but the ribs are more distant. It is finer ribbed than *Patula infecta*.

P. EREMITA Suter. Pl. 19, figs. 37, 38, 39.

Shell very minute, subdiscoidal, umbilicated, pale horny with faint broad streaks of darker horny, silky, fragile, transparent; with fine and numerous ribs, slightly arcuated and directed forwards on the upper surface, straight on the side and beneath; about 70 in the tenth of an inch (28 per mm.). Spire minute. Whorls 4½, narrowly rolled up, regularly but slowly increasing, rounded, the last not descending. Suture deep. Aperture subvertical, rotundly lunate, but little excavated by the penultimate whorl. Peristome straight, acute, regularly arched, margins convergent. Columellar margin short, arcuate, not reflected. Umbilicus broad, perspective, one-third of the diameter. Diam. 2, height 0·75 mill. (*Sut.*)

South Island of New Zealand, at White Horse Hill, Hooker Valley.

P. eremita Sut., Trans. N. Z. Inst. xxiii, p. 87, t. 17, f. 6, a, b.

This shell represents a middle form between *Patula inflecta* and *P. corniculum*.

P. biconcava Pfr. (Vol. I, p. 130.)

This species, hitherto considered an *Elava* or a *Diplomphalus*, has been ascertained by Mr. Suter to agree in jaw and dentition with the normal New Zealand *Charopæ*. The same is true of the following three species. See Trans. N. Z. Inst. xxiv, 1891, p. 295, pl. 22, f. 30, 31 (jaw and dentition). Mr. Suter found the species in Forty-mile Bush, North Island.

P. subantialba Suter. Pl. 19, figs. 40, 41, 42.

Shell small, discoidal, light horny to white, somewhat shining, fragile, transparent, very closely and finely ribbed; ribs directed forwards, slightly undulating on the upper surface, straight on the side, about 90 ribs in the tenth of an inch (35 per mill.). Spire deeply concave, infundibuliform. Whorls 5, the first ones very narrow, the last very large, nearly two-thirds of the diameter; the inner whorls swollen, the last descending rapidly on the inner side and falling slowly arcuated to the periphery. Suture very deep. Last whorl not descending. Aperture lunar, small, vertical, strongly excavated by the penultimate whorl. Peristome straight, acute; upper margin narrowly, the lower more widely arcuated. Margins convergent. Umbilicus large, deep, perspective, presenting nearly the same aspect as the upper surface.

Diam. 1·75, height 0·8 mill. (*Suter.*)

Hastwell, Mauriceville, Forty-mile Bush, North Island, New Zealand, damp places, under rotten wood in the bush.

Diplomphalus subantiabla Sut., Tr. N. Z. Inst. xxii p. 226, t. 15, f. 10, *a*, *b*, (shell).—*Patula subantialba* Sut., *l. c.* xxiv, p. 295, t. 22, f. 32, 33 (jaw and dentition.)

This shell is a good miniature of *Helix antialba* Beddome, of Tasmania, but differs from it.

P. huttoni Suter. Pl. 19, figs. 43, 44, 45.

Shell small, discoidal, light horny, with fine well-developed ribs, directed forwards and arcuated on the upper surface, slightly undulated on the periphery; about 40 ribs in the tenth of an inch (16 per mm.). Spire deeply concave, to about one-third of the

height. Apex smooth, white, shining. Whorls 4½, the inner ones narrow, the last largely developed, occupying two-thirds of the diameter, not descending, on the inner side rapidly ascending, regularly arcuated to the periphery. Suture very deep. Aperture lunar, narrow, vertical, much excavated by the penultimate whorl. Peristome straight, acute; upper margin narrowly, lower more broadly arcuated; columellar margin vertically descending, margins convergent. Penultimate whorl smooth, white, rather callous. Umbilicus broad, deep, perspective, about one-third of the diameter.

Alt. 1·5, diam. 2·7 mill. (*Sut.*)

Hastwell, Forty-mile Bush, North Island, New Zealand.

Diplomphalus huttoni Sut., Tr. N. Z. Inst. xxii, p. 226, t. 15, f. 11, *a*, *b* (shell).—*Patula huttoni* Sut., *l. c.* xxiv, p. 273.

P. moussoni Suter. Pl. 19, figs. 46, 47, 48.

Shell small, discoidal, white, banded with brown, the streaks following the direction of the ribs at irregular distances, faintly shining, thin, transparent, strongly ribbed; ribs sharp, directed forwards and arcuated on the surface, slightly undulating on the periphery, straight below, about 18 ribs in the tenth of an inch (7 per mm.). Spire concave to about one-quarter of the height. Apex smooth, shining. Whorls 4, the first 3 very narrow, the last large, two-thirds of the diameter, not descending, on the inner side rapidly ascending, regularly arcuated outside. Suture very deep. Aperture vertical, lunar, excavated by the penultimate whorl. Peristome straight, acute, lower margin regularly arcuated, the upper margin forming a much narrower arch; columellar margin descending nearly vertically, not reflected; margins convergent. Penultimate whorl smooth, white, somewhat callous to a short distance outside the aperture. Umbilicus broad, perspective, about one-quarter of the diameter. Alt. 2, diam. 4 mill.

Hastwell, Forty-mile Bush, North Island, New Zealand.

Diplomphalus moussoni Sut., Tr. N. Z. Inst. xxii, p. 227, t. 15, f. 12, *a*, *b* (shell).—*Patula moussoni* Sut., *l. c.*. xxiv, p. 273.

(2. *Species of Lord Howe Island.*)

P. wilkinsoni Brazier. Pl. 19, figs. 49, 50.

Shell small, discoidal, obtusely carinated, thin, translucent, color pale yellow alternating with red radiating dashes; whorls 4½, convex slowly increasing; sculpture fine regular microscopic costæ

decussated by similar spiral liræ; suture impressed, spire plane umbilicus wide, one-third of diameter, aperture vertical, ovate lunate, peristome sharp, thin.

Diam. maj. 2½, min. 2. alt. 1 mill. (*Hedley.*)

Lord Howe Island; between the North Ridge and Old Settlement.

Helix (*Charopa*) *wilkinsoni* BRAZIER, Austr. Mus. Mem. no. 2, t. 5, f. 3, 4 (reversed), 1889.—*Charopa wilkinsoni Braz.*, HEDLEY, Rec. Austr. Mus. i, p. 138, June, 1891.

The type is in the Australian Museum. My artist has copied the original figures, rectifying the accidental reversion.

P. UNWINI Brazier. Pl. 19, figs. 51, 52.

Shell small, depressed, thin, translucent, umbilicate; color uniform pale yellow; whorls 4, rounded, gradually increasing; sculpture oblique radiate striæ; spire slightly elevated, apex obtuse; suture impressed; umbilicus wide, one-third of the diameter, deep, perspective; aperture not descending, roundly lunate, peristome thin, straight. Diam. maj. 2½, min. 2, alt. 1½ mill. (*Hedley.*)

Low grounds at the north end of Lord Howe Island.

Helix (*Patula*) *unwini* BRAZ., Austr. Mus. Mem. no. 2, t. 4, f. 5, 6 (reversed).—*Charopa unwini Braz.*, HEDLEY, Records Australian Museum i, p. 138.

The type is in the Australian Museum.

P. WHITELEGGEI Brazier. Pl. 19, figs 53–58.

Shell discoidal, umbilicate, thin, translucent; color chestnut painted with zig-zag straw flames, interior subnacreous with bluish lustre. Whorls 3½, rapidly increasing, flattened between the periphery and the suture, subangled at the periphery, slightly descending at the aperture. Sculpture: numerous irregular oblique sinuate sharp costæ, which are smaller and closer on the last whorl; in their interstices and parallel to them are close fine hair lines; there is a decided break in the sculpture on reaching the embryonic whorls which faintly repeat the adult sculpture. Suture deep, acutely impressed, spire sunk, embryonic whorls 1½, distinct; epidermis glistening; base rather flattened, umbilicus about one-sixth of major diameter, perspectively exhibiting all the earlier

whorls, aperture diagonal, peristome straight, sharp, body-whorl overlaid by a thin callus.

Diam. maj. 16, min. 13, alt. 6 mill. (*Hedley.*)

Summit of Mt. Ledgbird, Lord Howe Island.

Helix (*Rhytida*) *Whiteleggei* BRAZIER, Australian Museum Memoirs, no. 2, t. 4, f. 23–25 (figures reversed and bad; no description) 1889.—*Helix* (*Rhytida*) *balli* BRAZ., loc. cit., t. 4, f. 13, 14, 26.—*Helix* (*Rhytida*) *ledgbirdi* BRAZ., loc. cit., t. 4, f. 19, 20.—*Patula whiteleggei Braz.*, HEDLEY, Rec. Austr. Mus. 1, no. 7, p. 138, t. 21, f. 6 (jaw) and f. 1 (dentition), June, 1891 with var. *balli* Braz., p. 139, and var. *ledgbirdi* Braz., p. 140.

Var. BALLI Brazier. Pl. 19, figs. 59, 60, 61.

Shell depressly globose, often eroded; whorls rounded. Spire slightly raised, base rounded, umbilicus narrow but exhibiting the previous volutions. Alt. 6, greater diam. 11, lesser 10 mill.

Summit of Mount Ledgbird.

Var. LEDGBIRDI Brazier. Pl. 19, figs. 62, 63.

Shell globosely conoid, whorls rounded, spire elevated, base rounded, aperture subcircular, umbilicus narrow.

Diam. maj. 8, min. 7, alt. 6 mill. (*Hedley.*)

Western flanks of Mount Ledgbird.

The type specimens of this species and its varieties are in the Australian Museum.

I have copied the figures from Mem. Austr. Mus., although they caricature rather than illustrate the species. Figs. 53, 54, 55, are drawn from a specimen before me (No. 62,421 of the Acad. Mus.), supplied by Dr. James C. Cox. The sculpture and coloring of this specimen correspond to Hedley's most excellent description of *whiteleggei;* the spire is plane; umbilicus between one-sixth and one-seventh the diameter; alt. 6, greater diam. 12½, lesser 10 mill.

Although rather aberrant, I am still disposed to group this species in *Charopa.*

(3. *Species of Tasmania and S. Australia.*)

P. ANTIALBA Beddome. Pl. 36, figs. 23–26.

Shell thin, transparent; contour, a sphere truncated at the poles, *deeply concave above and below,* the umbilical excavation deepest. Color brown, the shade of dry dead leaves, streaks of slightly lighter shade represent the flame painting of other species.

Whorls 5, the earlier enrolled within the later and almost concealed by them. From the channelled suture the last whorl rises perpendicularly, then arches outwards to its summit, from which it describes a curve of a third of a circle to its base, whence it incurves to the umbilical crater. The characteristic involute growth does not occur till the shell has attained a whorl and a half, at which point the embryonic sculpture is interrupted (as described in *albanensis*) by the adult and the shell at once commences to widen axially; viewed either from above or beneath, the smoother plane embryonic shell is seen as the flat floor of the spiral or umbilical pit. Sculpture: the last whorl is adorned with 150 sharp erect straight costæ, which are seen to stand out in profile on the periphery like the teeth of a circular saw; they are directed straight across the whorl from the spiral to the umbilical sutures and may be likened to the lines of longitude on a terrestrial globe. The secondary sculpture varies upon different parts of the shell, that sketched in the accompanying illustration is selected from the umbilical wall of the last revolution. Upon the spire two or three raised hair-lines parallel to the costæ occupy the intercostal spaces, at right angles similar hair-lines cross both these and the costæ, producing a reticulated appearance. Towards the periphery these spiral lines grow faint, while the intercostal lines multiply to half a dozen, within the umbilicus the transverse lines diminish and the spiral sculpture assumes the supremacy. Umbilicus cup-shaped, profound, exposing every revolution, a third of the shell's diameter in width. Aperture perpendicular, crescentic, peristome straight, sharp, scarcely reflexed on the columellar margin, projecting at the periphery past an imaginary line drawn from insertion to insertion. Callus smooth, shining, thick, semitransparent, quite burying the overtaken costæ, projected on the penultimate whorl in advance of the peristome. Diam. maj. 2½, min. 2¼, alt. 1½ mill. (*Hedley.*)

Gad's Hill and Mount Bischoff, Tasmania (Beddome); occurred under timber.

Helix antialba Beddome, Monograph of the Land Shells of Tasmania p. 41; Proc. Roy. Soc. Tasmania 1879, p. 23; Suter, Trans. N. Z. Inst. xxii, 1889, p. 226.—*Charopa antialba* Hedley, Proc. Linn. Soc. N. S. Wales 1892, t. 1, f. 5–8.

The type is in the collection of C. E. Beddome, Esq., R. N. The above description and the figures are from advance proofs of an article by my friend, Charles Hedley.

Var. ALBA Hedley.

Entirely hyaline-white. Occurred with the above.

P. GADENSIS Beddome. Pl. 35, figs. 16–18.

Shell thin, transparent; contour discoidal, spire plane. Color hyaline-amber, unicolorous. Whorls 3½, rather rapidly increasing, deeply channelled at the suture, rounded on their summits and at the periphery, flattened somewhat on the base. Sculpture: embryonic whorls comprising the first 1½ revolutions delicately sculptured by faint transverse capillary costæ, the adult whorls are ornamented by fine capillary costæ, of which the last whorl bears about 175. These are directed straight across the whorl, and are everywhere crossed by very minute raised hair-lines, which within the umbilicus grow coarser and dominate the transverse lines. Umbilicus about a third of the diameter of the base, deep cup-shaped, margin rounded. Aperture slightly oblique, roundly lunate, peristome straight, sharp, projecting at the periphery, scarcely reflexed on the columellar margin. Callus projecting, bluish-white, thin, just burying the costæ of the preceding whorl.

Diam. maj. 2, min. 1¾, alt. ¾ mm. (*Hedley.*)

From Gad's Hill to Mt. Bischoff, Tasmania (Beddome); occurred in and under decayed timber.

H. gadensis Beddome, Monograph of the Land Shells of Tasmania, p. 29; Proc. Roy. Soc. of Tasmania, 1879, p. 23.—*Charopa gadensis* HEDLEY, Proc. Linn. Soc. N. S. Wales, 1892, t. 2, f. 1–4.

The type is in the collection of C. E. Beddome, Esq. My figures and the above description are from advance proofs of an article by Mr. Charles Hedley.

P. BISCHOFFENSIS Beddome. Pl. 35, figs. 19–22.

Shell thin, globose, slightly gibbous, very narrowly perforated. Color brown, some specimens darker than others; the last whorl apparently darker than its predecessors. Whorls 5½, slowly increasing, the penultimate wider than the final when seen from above, channelled at the suture, tumid beneath it; last whorl gradually and slightly ascending at the aperture, rounded at the periphery and on the base. Sculpture everywhere closely ornamented by microscopic transverse raised hair-lines, whose interstices are latticed by smaller spiral lines; upon the base there are distinguishable some thirty faint and irregular spaced costæ, but this primary sculpture

is obsolete above. Embryonic shell of 1½ whorls plane and nearly smooth, clearly marked off from the adult. Umbilicus very narrow, abrupt at the margin, half covered by a tongue of callus. Aperture crescentic, perpendicular, peristome thin, straight, projecting little at the periphery. Callus especially prominent and heavy, curving obliquely across the whorl.

Diam. maj. 2½, min. 2¼, alt. 2 mill. (*Hedley.*)

Mt. Bischoff, Tasmania (Beddome); occurred under timber.

Helix bischoffensis BEDDOME, Monograph of the Land Shells of Tasmania, p. 39; Proc. Roy. Soc. Tasmania, 1879, p. 23.—*Charopa bischoffensis* HEDLEY, Proc. Linn. Soc. N. S. W. 1892, t. 2, f. 1–4.

The type is in the collection of C. E. Beddome, Esq., R. N. My description and figures are copied from advance proofs of an article by my friend Mr. Hedley, now in press.

P. RETEPOROIDES Tate. Pl. 30, figs. 33, 34, 35.

Shell rather widely umbilicated, depressed, orbicular, thin; spire a little elevated; whorls five, convex, separated by a deeply impressed or channelled suture; last whorl rounded, not descending in front, base convex; aperture slightly oblique to the vertical axis, subcircular; peristome simple, its margins disunited; columella slightly reflected over the umbilicus, which is wide and perspective. The ornamentation consists of regular, crowded, thin, elevated, equal ridges, and transverse equidistant microscopic striæ in the intercostal furrows; the ridges are more distant on the spire whorls than on the last whorl; the transverse striæ are more conspicuous on the base, and the distance between them about equals the width of the interstitial grooves. Color of shell reddish-brown. (*Tate.*)

Alt. 4, greater diam. 7, lesser 6·25 mill.; diameter of umbilicus 1·5 mill.

Black Hill, near Adelaide, under rotten stumps of the grass-tree; under stones at the foot of the cliffs at the junction of the River Para and Jacob's Creek; slopes of Kaiserstuhl, Barossa Range; in the stringy bark forests about Clare and Penwortham, S. Australia.

H. reteporoides TATE, Trans. and Proc. and Rep. Roy. Soc. S. Austr. ix, p. 62, t. 5, f. 14, 1887.

This species belongs to a group of small shells, more or less depressed and ornamented with raised lamellæ, represented by many species in Tasmania, with most of which I have compared it, and by three described species in South Australia, but two or more spe-

cies yet remain undiagnostically known. As implied by the specific name, the shell above described has affinity with *H. retepora* Cox, inhabiting the Flinders Range and at Port Lincoln; the general shape is the same, but in *H. reteporoides* the spire is not quite so elevated, the whorls more rotund, deeper suture, more convex base, larger umbilicus, the costal lamellæ equal and very much more numerous, and the transverse striæ finer. (*Tate.*)

Unfigured species described as Charopa.

Charopa baldwini Ancey, Sandwich Is. Bull. Soc. Mal. Fr. 1889, p. 176.

Microphysa. (III, p. 96.)

H. lansingi Bld. and *H. stearnsi* Bld. (p. 102), belong to the genus *Pristiloma*, in the *Zonitidæ*. See Pilsbry, Proc. Acad. N. S. Phila. 1889, p. 191.

P. hypolepta (Shuttleworth) Pils Pl. 21, figs. 28, 29, 30.

Shell minute, discoidal; whitish, subtranslucent and shining, with wrinkles of growth above, nearly smooth beneath. Whorls 4, very convex, quite gradually widening, the periphery of the last one above its middle, the lower-lateral surfaces sloping, somewhat as in *H. vortex* Pfr. The aperture is small, not very oblique, oval. Lip acute, upper and basal margins quite arcuate, the baso-columellar margin slightly expanded. The umbilicus is broad, more than one-third the diameter of the shell. Alt. 1, diam. 2¼ mill.

Bermuda.

H. hypolepta Shuttlw., *MS.;* see Diag. n. Moll., no. 6, Bern. Mittheil. March, 1854, p. 129.—*H.* (*Microphysa*) *hypolepta* Pilsbry, Proc. Acad. N. S. Phila. 1889, p. 82, t. 3, f. 6, 7, 8.

It is evidently allied to *H. vortex* Pfr., but is much smaller, flatter, with broader umbilicus. *Hyalinia minuscula* need not be compared with this species, a glance at the figures shows at once its dissimilarity. Shuttleworth never described this species, of which he received specimens from Bland. A part of those before me are also from Bland.

P. intonsa Pilsbry. Pl. 21, figs. 31, 32, 33.

Shell very small, narrowly umbilicated, thin, chestnut-brown, semi-globose. Whorls 4, well rounded, separated by very deeply

impressed sutures. Apex obtuse; last whorl rounded at the periphery. Surface smooth, very lightly striatulate, having long, whitish, sparsely scattered, delicate hairs, usually rubbed off except at the sutures. Aperture slightly oblique, oval, parietal wall a little flattened. Lip sharp, acute, very slightly expanded at the columellar margin. Alt. 2, diam. 1·8 mill.

Orizaba, Mexico.

Patula intonsa Pils., Proc. Acad. N. S. Phila. 1891, p. 314, t. 15, f. 1–3.

The sparsely scattered, partly deciduous hairs are peculiar and characteristic.

P. venezuelensis Jousseaume. Pl. 21, figs. 24, 25.

Shell broadly and deeply umbilicated, suborbiculate-depressed, thin; brown-flesh colored; striate; ornamented with irregular and oblique caducous lamellæ. Whorls 4½, convex, obtusely carinated. Aperture subrotund; peristome simple, thin and acute.

Alt. 2½, greater diam. 4½, lesser 3½ mill. (*Jouss.*)

Colony of Torar, and at Valencia, Venezuela.

Trichia venezuelensis Jouss., Mém. de la Soc. Zool. de France, ii, p. 248, t. 9, f. 12, 13, 1889.

The cuticle is thin and covered with little caducous, close oblique lamellæ, the free edges of which bear very short hairs, flattened and elongated in the direction of the lamellæ.

P. rojasi Jousseaume. Pl. 21, figs. 26, 27.

Shell deeply umbilicately, subglobose, thin, brown-flesh colored, obliquely striated with scaly lamellæ. Whorls 4, rounded, convex. Aperture subrotund; peristome simple, thin, acute.

Alt. 2, greater diam. 3, lesser 2½ mill. (*Jouss.*)

Caracas, Venezuela.

Trichia rojasi Jouss., Mém. Soc. Zool. Fr. ii, p. 249, t. 9, f. 9, 10.

The surface is covered with a lamellose cuticle; the lamellæ are slashed on the edges, giving the appearance of minute, regularly arranged scales. This species is closely allied to the preceding.

Section MACROCYCLOIDES Martens (Vol. III, p. 48.)

P. MICROCYCLIS Boettger. Pl. 42, fig. 33.

Shell small, perspectively umbilicated, the umbilicus over two-sevenths the diameter of the shell, depressed-convex, rather solid, corneous-yellow, oily-shining; spire conoid-convex, apex obtuse, slightly projecting. Whorls 4½, slowly increasing, little convex, separated by an impressed suture, ornamented with sigmoid impressed lines here and there deeper, and closer at suture and umbilicus; last whorl flattened above, at the periphery rounded-subangulate, the base convex, slightly enlarged toward the aperture, not descending. Aperture moderately oblique, truncate-piriform; peristome obtuse, margins distant, joined by a callus, the upper margin straightened, obliquely descending, subretracted at the suture, then lightly subangularly protracted, simple; columellar margin slightly thickened and a little reflexed. (*Bttg.*)

Alt. 3–3½, diam. 5–6 mill.; apert., alt. 1⅝–1⅞, width 2⅛–2⅝ mill.

Hitulama, North Amboyna; Ema and Kusukusu (Sereh), South Amboyna.

Macrocycloides microcyclis BTTG., Ber. Senck. Naturf. Ges. 1891, p. 260, t. 3, f. 7, 7a.

Readily distinguished from known species of *Macrocycloides* by the small size and lack of spiral striation. The upper surface reminds one somewhat of *Hyalinia (Polita) petronella* Charp., and the umbilicus and aperture strongly resemble those of *Macrocyclis* [*Selenites*] *concava* Say.

P. SAPARUANA Boettger. Pl. 42, figs. 31, 32.

Shell small, broadly umbilicated, the umbilicus one-third the width of the shell, convex-depressed, thin, corneous-brownish, unicolored, oily-shining; spire very little elevated, slightly convex, apex obtuse, slightly prominent, whorls 4½, slowly increasing, a little convex, separated by impressed sutures; ornamented with sigmoid impressed lines, here and there deeper, and closer at suture and umbilicus; last whorl flattened above, the periphery very distinctly angulated, convex below; before the aperture not descending. Aperture small, moderately oblique, subcircular, angled above and at the right side; peristome slightly obtuse, the margins subdistant, joined by a callus; upper margin little curved, obliquely descend-

ing, basal well rounded, columellar slightly thickened and a trifle reflexed. (*Bttg.*)

Alt. $2\frac{3}{4}$–3, diam. $5\frac{1}{2}$–6 mill.; apert., alt. $1\frac{5}{8}$, width 2 mill.

Papero, Island of Saparua.

Macrocycloides saparuana Bttg., Ber. Senck. Naturforsch. Ges. 1891, p. 260, t. 3, f. 8a-b.

The umbilicus is wider than in *microcyclis* Bttg., the entire contour flatter, lens-shaped, the periphery angular, mouth smaller with less steep and rectilinear upper margin.

P. sericina Boettger. Pl. 42, figs. 34, 35.

Shell small, perspectively umbilicated, the umbilicus $\frac{2}{5}$–$\frac{1}{3}$ the width of the shell, depressed-convex, thin, whitish, satiny; spire convex, apex little prominent. Whorls 4–$4\frac{1}{4}$, slowly increasing, convex, separated by a profound suture; ribbed with very close hair-like striæ, and in the interstices microscopically spirally lineolate; last whorl much flattened above, rounded at the periphery, the base more convex, subcylindrical; slightly widening toward the aperture, not descending. Aperture moderate, rather oblique, truncate-piriform; peristome simple, rather acute, the margins distant, joined by a callus; the upper margin straightened, obliquely descending, columellar margin not thickened, and but a trifle reflexed. (*Bttg.*)

Alt. $1\frac{3}{4}$–2, diam. 3–$3\frac{1}{2}$ mill.; apert., alt. $1\frac{1}{8}$, width $1\frac{5}{8}$ mill.

Oma, Island of Haruku.

Macrocycloides sericina Bttg., Ber. Senck. Naturf. Ges. 1891, p. 261, t. 3, f. 9, 9a-b.

It is easy to separate this from the relatives of *M. microcyclis* Bttg. by its white color, dull satin luster, the close rib-striation, and small size. It is interesting to find that the three principal islands of the Amboyna group has each a well-defined species of *Macrocycloides!*

Acanthinula (Vol. III, p. 53.)

A. peracanthoda Bgt. (*H. Raffrayi* Bgt., *olim.*)

Cockerell has proposed to substitute the name *raffrayana* for *raffrayi* (Journal of Conchology, Leeds, 1888, p. 261) but Bourguignat's name *peracanthoda* has priority.

Section Anguispira Morse (Vol. III, p. 55.)

This group of Patula is confined to the temperate portions of North America. It consists of rather large species, all of which are

remarkable for their polymorphism. The species may be divided into two sections: the first, or typical ANGUISPIRA, proposed for *alternata*, including also *mordax* and *cumberlandiana* (which are hardly more than extreme forms of *alternata*), is characterized by a flammulate, regularly striated shell, by the oviparous mode of reproduction, etc., and is not far removed from the section *Discus*. The second division or section has a unicolored or spirally banded shell, irregularly striated or ribbed, often spirally striated, and gives birth to living young. The young usually have spiral rows of hairs, and resemble considerably some New Zealand Patuloid forms, which probably reproduce in the same manner. In the species of this division, the characters of sculpture, form and color, and to a less degree of the soft parts, vary to an extent inconceivable to those who have not actually seen the shells. It may now be demonstrated that the forms described as *H. strigosa, cooperi, idahoensis, hemphilli, haydeni, etc.*, are connected by such a multitude of intermediate forms that it is absolutely impossible, by the most acute analysis, to draw lines of demarcation between them. It is even impossible to classify many specimens if we attempt only the division into three series, as is done below.

The literature of these varieties and forms will be found in the NAUTILUS for 1890, and in Binney's Second (1886), Third (1890), and Fourth (1892), Supplements to Terr. Moll. V. The classification is mainly that given by Binney (*l. c.*)

P. STRIGOSA Gould. (Vol. III, p. 56.)

(1) *Radially ribbed forms* (*P. idahoensis* Newc.)

Var. IDAHOENSIS Newc.

The type of this group of forms is well represented by figs. 29, 30, 31 of pl. 10, in Vol. III, representing the typical *Patula idahoensis*. I have not seen intermediate forms absolutely uniting this to var. *binneyi* (below), but the unbridged space between the two is so narrow that perfectly intermediate examples may be confidently expected.

Var. NEWCOMBI Hemphill. Pl. 41, fig. 88 (typical), figs. 89, 90 (var.)

This is perhaps the most extraordinary of the entire *strigosa* series. The shells were collected near Ogden, Utah, at an altitude of 4500 feet. In the typical *newcombi* (fig. 88) the body-whorl is rounded but there is a keel sketched around it; the surface has

coarse, irregular riblets, and two purple-brown bands. This form Hemphill collected among leaves and brush, etc., on the steep shady sides of a gulch facing the north, some miles north of Ogden. Nearer the city, among quartzite boulders, in a single limited spot, the shells were much more elevated (figs. 89, 90) and strongly carinated, the bands faint or absent. This form Hemphill calls *wasatchensis*.

Var. BINNEYI Hemphill. Pl. 41, figs. 79, 80 (typical), 81–87 (varr.)

When typically developed this form has the elevated contour of *P. idahoensis*, from which it differs in the more numerous and irregular smaller riblets. It is white, usually pink on the inner whorls; the aperture is circular, and the baso-columellar lip often develops a callous nodule within (fig. 80). This form is common in Box Elder Co., Utah. It passes directly into the var. *cooperi* which is numerous in Box Elder Cañon, and which differs typically in lacking riblets. As I have said above, some specimens are bandless; but others show faint bands, and still others have two strong purple-brown bands. The latter, when strongly ribbed are Mr. Hemphill's "var." *multicostata* (fig. 81); specimens of which show vast variations in ribbing, in degree of elevation, and in size, diam. 10 to 20 mill. By rather gradual stages these bands become wider, until they cover all of the surface except a whitish central band and umbilical patch, or even these disappear. It is then the "var." *castanea* Hemphill (figs. 84, 85). It should be noted that some of the *castanea* are so smooth that they would pass as a variety of typical *strigosa*; others pass directly into "var." *albofasciata* Hemphill (figs. 86, 87). All of the above forms are from Box Elder Co., Utah.

The form *multicostata* noted above as a color form of var. BINNEYI, presents no characters distinguishing it from Hemphill's form *gouldi* (figs. 82, 83) from the banks of the Bear River, north of Brigham City, Utah, except that the latter is smaller than the forms originally named *multicostata*; but the sizes intergrade.

(2) *Smooth forms* (*P. strigosa* Gld.)

These forms have neither the oblique ribs of the preceding, nor the spiral threads or cords of the following series (3). The surface is obliquely striated either finely or rudely, and often decussated by microscopic spiral incised lines.

Var. STRIGOSA Gould (typical) Vol. III, pl. 10, figs. 32, 33, 34. Pl. 42, figs. 7, 8, 9.

Far to the westward of all other colonies of *strigosa*, at Spokane, Washington, is found a variety remarkable for its elegant sculpture and coloring. The form is rather depressed, surface finely wrinkle-striate and decussated by finer spiral incised lines. The color is whitish, much stained and mottled with fleshy-brown above, or entirely flesh-brown with white striæ; base whitish in adults, flesh-brown in the young. Most specimens show many dots of translucent brown. There are generally two bands, one above, one below, but both are frequently lacking, and many specimens show additional bands on the base. The whorl descends toward the aperture, which is eliptical. This form is really the original and therefore the typical *strigosa* of Gould; but Hemphill has given to Spokane Falls specimens the name var. *parma* (pl. 42, figs. 7, 8, 9). Numerous specimens have been collected and distributed to American collectors by Mrs. Mary P. Olney, of Spokane, Wash., to whom I am indebted for those figured.

Var. JUGALIS Hemphill. Pl. 41, figs. 93, 94, 95.

A *very broad, depressed* form, from Salmon River, Idaho. It is more or less distinctly 2-banded, *the umbilicus is wide*, and the whorl *descends deeply at the aperture*. The surface is coarsely striated, but not ribbed. Hemphill's var. *intersum* (pl. 41, figs. 91, 92) is a smaller form of this in which the surface is generally more suffused with purple-brown, and is more distinctly costulate, sometimes as distinctly as in var. *binneyi*.

The following so-called varieties have been given names. They have no varietal standing; and there are several thousand forms of *strigosa* equally deserving of names:

Form *depressa* Ckll. is a flattened form represented in vol. III, pl. 10, fig. 36. Form *fragilis* Hemph. (pl. 41, figs. 5, 6) is moderately elevated, rather thin and somewhat translucent brownish or flesh colored, with two bands; from near Franklin, Idaho. Form *carnea* Hemph. is generally bandless, fleshy-brown above, usually whitish below, finely striated; from near Salt Lake. Hardly worth a name. Form *rugosa* Hemph. is a large robust variety with very convex whorls, from New Brigham City, Utah. A depressed form from near Logan, Utah, has been called var. *albida* Hemph. A form connecting with var. *binneyi* has been named *buttoni* Hemph. (pl. 41, figs. 97, 98). It is from Box Elder Cañon, Utah, and is often

toothed, like other varieties from the same locality. Form *globulosa* Ckll. from Summit Co., Col. is between *cooperi* and *strigosa*.

Var. SUBCARINATA Hemphill. Pl. 41, fig. 96 (type), figs. 99, 1, 2, 3, 4 (varr.)

At and near Rathdrum, Idaho, Hemphill collected large numbers of a form of *strigosa* remarkable for its great size. The shell is solid, and varies from chalky-white unicolored, to dingy brownish with two dark bands, and often numerous narrow bands beneath. They are often irregularly clouded with brown. The surface is rather rudely striated, but not ribbed. The degree of elevation also varies within wide limits. The names *subcarinata* (fig. 96), *bicolor* (figs. 3, 4), *lactea* (fig. 99) and *picta* (figs. 1, 2) have been given by Hemphill, but one name is ample for the entire lot, the color varying so interminably that no two individuals (except the uniform white ones) can be found alike.

Form *utahensis* Hemphill. Pl. 42, figs. 10, 11.

This is a rough, coarse, carinated variety, figured in Terr. Moll. V., p. 158, fig. 66, and Man. Amer. L. Sh., p. 166, f. 154. The peristome is sometimes continuous by a raised heavy callus connecting its terminations.

Var. COOPERI W. G. Binney. Vol. III, pl. 10, fig. 35.

Elevated, globose forms, with cylindrical whorls, and round, rather than elliptical aperture. On one side this form passes into true *strigosa*, and on the other directly into the costate forms leading toward *P. idahoensis*. Cockerell has mentioned, without descriptions, the following forms of *P. strigosa cooperi*: *trifasciata* Mesa Co., Col.; *confluens*, Custer, Garfield and Mesa Cos., Col.; *elevata*, Delta Co., Col.; *major*, Mesa Co., Col.; and *minor* near Egeria, Routt Co., Col.

(3) *Spirally ribbed forms* (*P. haydeni* Gabb.)

These forms are characterized by the possession of spaced spiral cords or threads, between which a lens shows the surface to be decussated. They are generally unicolored soiled white except for the earlier whorls which are flesh tinted; but two faint bands appear on some examples. It is almost impossible to diagnose varieties, the series of forms being absolutely continuous. The following names have been given:

Form *hemphilli* Newc. is a variety existing over a considerable territory in Nevada, Idaho, Utah and Colorado. It is depressed, carinated, and begirt with fine thread-like spirals. Form *gabbiana* Hemph. (pl. 42, figs. 12, 13) is "a coarse, rough *haydeni* with the revolving ribs nearly or quite obsolete." It passes into *strigosa*. Form *bruneri* Ancey (or *aquirrhensis* Hemph.) has the spirals more developed than in *hemphilli*, but less than in *haydeni*. The ends of the peristome approach and are joined by a heavy callus. Form *haydeni* typical (vol. III, pl. 10, figs. 40, 41) is the most divergent of all, having very strong spiral cords and decussated intervals.

Another form, quite intermediate between *aquirrhensis* and *strigosa*, has been called var. *hybrida* by Hemphill. It is from near Logan, Utah.

Genus TROCHOMORPHA Alb. (Vol. III, p. 72.)

The following species were not included in Tryon's account of this group in vol. III.

T. HAENSELI Schmacker and Boettger. Pl. 30, figs. 6, 7, 8.

Shell moderately widely umbilicated, the umbilicus ⅛ the diam. of the shell; conic-depressed, compressedly carinated, shining, olive-brown, unicolored; spire little raised, exactly conical, apex rather acute. Whorls 6½, very slowly increasing, very slightly convex, at the suture distinctly hair-marginate, costulate-striate, without spiral lines; the last whorl rather convex beneath, roundly angled around the umbilicus, scarcely wider than the penultimate whorl, hardly descending. Aperture moderately oblique, irregularly rhomboidal; peristome simple, rather obtuse, the upper margin very short, sigmoid, little protracted, basal margin receding in the middle, columella obliquely ascending, almost subangulated where it joins the basal lip, both subcalloused and slightly reflexed.

Alt. 5–5¼, greater diam. 12½–13½ mill.; apert., alt. 3½–3¾, width 4¾–5 mill. (*S. & B.*)

South Cape of Formosa.

T. haenseli S. & B., Nachr.-Bl. 1891, p. 152, t. 1, f. 5.

T. borealis Mlldff. (Nachr.-Bl. 1888, p. 39) is closely allied, but smaller, less dark, the umbilicus narrower, the spire rather convex-conic, and the keel less acute; the basal lip is also more deeply S-shaped in the continental species.

T. TONKINORUM Mabille. Pl. 30, figs. 17, 18, 19.

Shell rather widely and perviously umbilicated; subtrochiform, very much depressed, rather thin but somewhat solid; rufescent; rather rudely costulate-incised, and marked with some inconspicuous spiral lines; spire slightly convex, slightly projecting; apex obtuse, concolored. Whorls 6, convex-flattened, carinated, regularly widening, separated by a margined, impressed suture; the last whorl carinated, a little convex in the middle, toward the carina compressed, beneath radiately striated and slightly convex, obtusely angled around the umbilicus. Aperture oblique, small, ax-shaped; margins remote; peristome straight, acute.

Alt. 3½, greater diam. 13, lesser 12 mill. (*Mab.*)

Tonquin.

T. tonkinorum MAB., Moll. Tonk. diagn. p. 7, May 14, 1887; Bull. Soc. Mal. Fr. iv, p. 97, t. 3, f. 1, 2, 3.

T. INFANDA Semper. Pl. 20, fig. 4.

Shell narrowly umbilicated, depressed, regularly striated above, marked with impressed lines beneath; reddish-chestnut, begirt with a tawny band at the periphery. Spire depressed-conic, apex obtuse. Whorls 5–6, nearly flat, carinated, the last convex beneath, nearly smooth. Aperture oblique, angulate-lunar; peristome simple, acute, the upper margin straight, columellar margin not thickened.

Alt. 5½, greater diam. 12, lesser 11 mill. (*Semp.*)

Digollorin, Palanan and Cordillera of Amberbuk, E. coast North Luzon.

T. infanda SEMP., Reisen, p. 117.—HIDALGO, Journ. de Conch. 1887, p. 93, t. 3, f. 5; Obras Malacol. i, p. 114.

Hidalgo considers this a color-variety of *Tr. albocincta* Pfr.

T. LUTEOBRUNNEA Möllendorff. Pl. 20, figs. 20, 21.

This is the form figured by Hidalgo (Journ. Conch. 1887, p. 95, t. 4, f. 2), as *Tr. splendens* Semp. It is from the Island Sibuyan, Philippines. No diagnosis has been published. See Mlldff. Landschn. Cebu, p. 213, foot of page, and Hidalgo, Obras Malacol. i, p. 116.

T. LOOCENSIS Hidalgo. Pl. 20, figs. 11, 12, 13.

Shell very broadly umbilicated, very much depressed, discoidal, very acutely carinated; very thin; pellucid, a little shining, scarcely striatulate, corneous-brown, unicolored. Spire flattened, slightly

elevated, obtuse. Suture simple. Whorls 6, the first slightly convex, the rest flat, slowly increasing, the last a little wider than the penultimate; rather swollen around the umbilicus, obtusely angulated, not descending in front; aperture subtriangular, depressed; peristome simple. Umbilicus large, perspective, one-third the diameter.

Alt. 3, greater diam. 15, lesser 13½ mill.; diam. of umbilicus 5 mill. (*Hid.*)

Mt. Cabugao at Looc, and Paragua, Tablas; Philippines.

Tr. loocensis Hid., Journ. de Conchol. 1887, p. 115, t. 4, f. 4; Obras Malacol. i, p. 21, 115.

T. metcalfei Pfr. Vol. III, pl. 17, figs. 17, 18 19.

From this species as defined by Pfeiffer and by Tryon (Man. iii, p. 85) must be separated the varieties "*minor*" and "*unicolor*" which have properly been defined as distinct species by v. Möllendorff, under the names *T. repanda* and *T. granulosa*.

The typical metcalfei is rather large (alt. 6½, greater diam. 20, lesser 18 mill.), of a corneous tawny color, with conspicuously white suture and keel, the latter bordered above and below with a broad tawny-brown band. The surface of the base is finely and beautifully cut by microscopic spirals, except around the umbilicus where it is more shining; the upper surface is slightly duller and lacks spiral lines. The umbilicus measures one-fifth the greater diameter of the shell. The last whorl generally descends a trifle below the keel in front.

It is very closely allied to *T. sibuyanica* in form, but rather less depressed, and conspicuously banded. It is a much larger shell than *T. repanda*. *T. granulosa* differs in being unicolored and strongly decussated above.

T. sibuyanica Hidalgo. Pl. 20, figs. 17, 18, 19.

Shell discoidal, depressed, acutely carinated, rather thin, subtranslucent, pale brownish-corneous-buff. Umbilicus perspective, its width contained 5–5½ times in the diameter of the base. Surface slightly shining above and marked with light growth-striæ; having a bright oily luster in the middle below, the outer half being duller and distinctly spirally striated below the keel. Spire low, depressed; whorls 6, the inner 2 convex, the rest flat, and separated by a non-impressed white suture; last whorl concave above and below the acute white-edged keel. Aperture very oblique, ax-shaped.

flesh-colored within: peristome simple, the upper lip thin, arched forward, basal lip regularly arcuate, slightly thickened.

Alt. 6½, greater diam. 24, lesser 20 mill.

Alt. 7, greater diam. 23, lesser 20 mill.

Lugar Espana, Island of Sibuyan, Philippines.

Tr. sibuyanica Hid., Journ. de Conchyl. 1887, p. 96, t. 5, f. 3; Obras Malacol. i, p. 20, 111.

The last whorl seen from above, is wider than usual, and the distance from the outer angle of the aperture to the line of the preceding whorl is about equal to the distance from the latter to the inner termination of the columella. The sculpture of the base also is characteristic.

T. quadrasi Hidalgo. Vol. IX, pl. 7, figs. 1, 2, 3.

Shell depressed, very acutely carinated, thin, subtranslucent, horn-colored, shining; very broadly umbilicated, the width of the umbilicus contained 4½ times in the greatest diameter of the shell.

Surface somewhat iridescent in places; having delicate growth-lines above, more glossy below, and closely spirally striated except just at the mouth of the umbilicus. Spire low-conoid, the inner two whorls convex, the rest nearly flat, slowly increasing, the last whorl at aperture about one-fifth the diameter of the shell. Suture hardly impressed, a white hair-line. Carina white-edged, the whorl concave above and below it.

Aperture oblique, ax-shaped, the upper lip arched forward, not arcuated, basal lip slightly thickened, white, regularly arcuate, the columellar termination somewhat more distant from the suture than the outer angle of the lip is.

Alt. 7½, greater diam. 24, lesser 21⅔ mill.

Alt. 7, greater diam. 22, lesser 20 mill.

Cuyapo, Province Nueva Ecija, Luzon, Philippines.

Trochomorpha quadrasi Hid., Obras Malacol. i, p. 117.—v. Moell. Nachrbl. D. M. Ges. 1891, p. 123.—*Tr. stenogyra* v. Moell. Nachr.-bl. D. M. Ges. 1890, p. 202.

This beautiful species is closely allied to *Tr. sibuyanica* and *Tr. metcalfei*. It differs from the former in the wider umbilicus, and comparatively narrower last whorl (seen from above); it differs from *metcalfei* in being larger with comparatively wider umbilicus, narrower last whorl, and in lacking the broad brown bands above and below the keel.

It was reported from Angat, Prov. of Bulacan, Luzon, by Hidalgo, this being the locality first given by the native collector from whom all the specimens were obtained; but subsequently he gave the locality Cuyapo. The above description and the figures are drawn from specimens furnished by Dr. v. Möllendorff.

T. REPANDA v. Möllendorff. Vol. III, pl. 17, figs. 20, 21.

This species has been figured as a variety of *H. metcalfei* (Man. III, p. 85.)

Middle Luzon, near Manila, etc.

Trochomorpha (*Videna*) *repanda* MLLDFF., Ber. Senckenb. Ges. 1890, p. 211; Nachr.-Bl. d. d. Mal. Ges. 1891, p. 42.—*H. metcalfei* var. β PFR., Monogr. i, p. 121; Conchyl. Cab., p. 97, f. 13, 14.—*T. boholensis* HID., Journ. de Conchyl. 1887, p. 94, t. 4, f. 1; not of Semper.

T. SPLENDENS Semper. Pl. 20, figs. 5, 6, 7.

Shell openly umbilicated, the umbilicus about equalling ⅓ the diameter of the basal; depressed, lens-shaped, thin, very oily-shining, of a horny-waxen color; acutely carinated, the spire depressed, little conoid. Whorls 6, slowly increasing, a little convex, rather distinctly striated, with no spiral liræ; suture rather impressed, margined; last whorl somewhat inflated beneath, almost smooth, roundly-angled around the umbilicus. Aperture moderately oblique, nearly rhombic; the peristome simple, upper margin straightened, lower deeply curved.

Alt. 5½, diam. 18½; alt. 6½, diam. 18 mill. (*Mlldff.*)

Zebu, Philippines.

Tr. (*Videna*) *splendens* SEMP., Reis. Phil. Landmoll., p. 118.—MLLDFF., Landschn. Cebu, p. 213, t. 8, f. 1.

Semper described from a young example. The prominent specific characters are the total lack of spiral sculpture, and the oily luster of the surface.

T. SPLENDIDULA Möllendorff. Pl. 20, figs. 1, 2, 3.

Intermediate between *splendens* and *costellifera*, but the shell is smaller, higher, more slowly increasing, the striæ more distinct than in the former of these, and it differs from the latter in being a little larger, not ribbed nor spirally striated. The shell is moderately umbilicated, umbilicus ⅕ the diameter of the base; depressed, discoid, thin, acutely carinated, horny-yellowish. Spire depressed but

distinctly conical. Whorls 5, slightly convex, slowly increasing, the suture moderately impressed, submargined; rather regularly and densely striated, hardly sculptured spirally; the last whorl is angulate-convex below, roundly-subangulated at the umbilicus, yellow-streaked at the aperture, below. Aperture little oblique, irregularly trapezoidal; peristome simple, arcuate, upper margin lightly curved, lower margin deeply curved.

Alt. 4¼–4½, diam. 12½ mill.; apert., alt. 3½, width 5¼ mill. (*Mlldff.*)

West coast of Zebu.

T. (*Videna*) *splendidula* Mlldff., Landschn. Cebu, p. 214, t. 8, f. 2.

The striation is stronger than in *T. splendens* but not so strong as in *costellifera*. The yellow streak just behind the lip, and parallel with it, is peculiar. Exact locality not known, but probably the village Balamban.

Hidalgo (Obras Mal. i, p. 115) considers this a form of *T. splendens* Semp., but it seems to be sufficiently distinct.

T. neglecta Pilsbry. Pl. 20, figs. 14, 15, 16.

Shell openly umbilicated, the umbilicus of a deep funnel shape, its width contained 5 or 5½ times in the diameter of the base; depressed, lens-shaped, acutely keeled, thin but rather strong, shining, light chestnut colored the apex pale corneous. The spire is conoidal; whorls 6 or 6½, slowly increasing, slightly convex, separated by a *suture distinctly dark-margined above*, scarcely impressed; the last whorl acutely keeled, a trifle concave above and below the keel; the base convex, roundly angled around the umbilicus. *Upper surface irregularly and coarsely plicate-striate;* lower surface more shining, smoother, lightly striated; *no spiral striæ either above or below.* Aperture rhomboidal, flesh-colored within; upper lip arched forward, thin; basal lip gently arcuate, somewhat thickened; columellar lip strongly arcuate.

Alt. 8, greater diam. 24, lesser 20½ mill.

Philippines.

This large species is distinguished by the strong striation of its upper surface, the total lack of spiral striæ, and the funnel shaped or conical umbilicus. It differs from *T. sibuyanica* in being a stronger, higher shell, with conical spire, stronger sculpture, narrower last whorl and in lacking spiral striæ. It differs from *T.*

hartmanni (Chemn. edit. II, Helix, t. 94, f. 16–18) in the more rapidly increasing whorls. The figure 16 represents the basal lip as too much arcuated, but in fig. 15 the columella should appear more strongly arched upward. The specimens before me are labelled "Mindoro," but I know not upon whose authority.

T. COSTELLIFERA Möllendorff. Pl. 20, figs. 8, 9, 10.

Shell umbilicated, umbilicus ⅛ the diameter of the base, conoid, depressed, thin, shining, corneous yellow, spire little raised, almost regularly conical, the apex rather acute, whorls 5½ slowly increasing, convex, regularly ribbed striate, decussated throughout by very delicate, distant impressed spiral lines, suture margined, crenulated, last whorl with a thread-like carina, the base striated, roundly angled around the umbilicus. Aperture oblique, irregularly rhomboidal, peristome simple, acute, upper margin straightened, lower margin rounded, sublabiate, columellar margin short, a little straightened, slightly thickened.

Alt. 4½, diam. 10 mill.; aperture, alt. 3¼, width 4 mill. (*Mlldff.*)

Northwestern Zebu, Philippines.

Trochomorpha (Videna) costellifera MLLDFF., Landschnecken Fauna, Cebu, p. 214, t. 8, f. 3, 1890.

No Philippine species is closely related to this handsomely sculptured *Trochomorpha*. From *T. splendens* and *T. splendidula* with which it shares the unicolored shell without a white keel-band, it is separated by the regular, strong, ribbed-striation and the presence of fine spiral sculpture. *T. acutimargo*, of which one is reminded by Tryon's illustration, is much larger 16 mm., diam., and according to the diagnosis is not ribbed but spirally striated, *T. albocincta* has a white keel band upon a darker color and it is besides not ribbed-striate. (*Mlldff.*)

T. GRANULOSA Mlldff. Pl. 20, figs. 22–24.

Shell openly umbilicated, convex-depressed, acutely carinated, minutely granulated by transverse striæ and fine spiral lines; corneous-tawny. Whorls 5½, slightly convex, the last a little excavated below the keel, then convex, obtusely angulated around the umbilicus. Aperture oblique, rounded rhomboidal; peristome straight, arcuate.

Alt. 6, greater diam. 14½, lesser 13½ mill. (*Mlldff.*)

Siquijor, Philippines.

T. granulosa MLLDFF., Nachr.-Bl. 1888, p. 144; *l. c.*, 1891, p. 43. —*H. metcalfei* var. PFR., Monogr. i, p. 121, and Conchyl. Cab., t. 97, f. 15, 16.

This species has been figured in Vol. III, p. 85, pl. 17, figs. 22, 23, as a variety of *H. metcalfei*.

T. STRUBELLI Boettger. Pl. 30, figs. 9, 10, 11.

Shell perspectively umbilicated, the umbilicus nearly equal to one-fifth the breadth of the shell; depressed conical, rather solid, rather shiny, olive-yellow, at the suture whitish, the carina white with a chestnut band above and below. Spire conic-convex, apex rather obtuse. Whorls 6, a little convex, separated by an appressed, submarginated suture, above regularly acutely striated, below distinctly spirally lirulate; last whorl acutely carinated, the carina compressed above and below, the base slightly convex; not descending in front. Aperture diagonal, rhomboid-ax-shaped; peristome straight, simple, the upper margin lightly curved, basal distinctly arcuate; columella slightly so above.

Alt. 5½, diam. 10 mill.; apert., alt. 3½, width 4 mill. (*Bttg.*)

Gunung Salak, Java.

T. strubelli BTTG., Bericht über die Senckenbergische naturforschende Gesellschaft in Frankfurt am Main, 1890, p. 143, t. 5, f. 5*a-c*.

This beautifully colored *Videna* is far higher (ratio 1 : 1·82) than *T. planorbis* (Less.) var. *javanica* Mouss. (ratio 1 : 2·17 to 1 : 3·13), *T. tricolor* Mts. (1 : 2·50) and *T. bicolor* Mts. (1 : 2·00 to 1 : 2·42); and from the last, its closest relative, it differs besides in lacking spiral lines upon the upper surface, and in the sharply contrasting spiral bands bordering the keel. (*Bttg.*)

T. CONCOLOR Boettger. Pl. 30, figs. 12, 13, 14.

Shell moderately umbilicated, umbilicus one-seventh the diameter of the shell; conic-depressed, rather thin, shining; olive-brown; spire depressed convex-conic; apex moderately obtuse. Whorls 5, slightly convex, separated by a lightly impressed suture, with an acute, concolored hair-margin; striatulate, without spiral lines; the last whorl carinated, the keel moderately acute, convex on the base, nearly subangled at the cylindrical umbilicus, not descending in front. Aperture diagonal, rhomboid-ax-shaped; peristome simple, upper margin slightly curved, basal angulate-arcuate, columellar lightly protracted.

Alt. $3\frac{5}{8}$–$3\frac{7}{8}$, diam. 7–$7\frac{1}{4}$ mill.; apert., alt. $2\frac{1}{2}$, width $3\frac{1}{2}$ mill. (*Bttg.*)

Gunung Gedeh, Java.

T. concolor Bttg., Ber. Senck. naturf. Ges. 1890, p. 143, t. 5, f. 6, 6a-c.

This unicolored, comparatively small *Videna* also seems to be higher than all of its Javanese allies (proportion 1 : 1·90). The nearest species to it may be *T. lardea* v. Mts. of Java and the Moluccas; but this has the proportion 1 : 2·55, and a white thickened lip. (*Bttg.*)

T. subnigritella Beddome. Pl. 43, figs. 44, 45, 46.

Shell moderately umbilicated, depressedly turbinate, quite rounded at the apex; whorls 6, very gradually increasing, faintly striated, the last sharply angled at the periphery, nearly flat on the under side; aperture oblique, subquadrate; peristome simple, the margins distant; color a rich dark brown, shining below.

Diameter $\frac{1}{2}$ inch, height $\frac{5}{6}$ inch. (*Beddome.*)

Andaman Is. (Hungerford.)

Trochomorpha subnigritella Bedd., P. Z. S. 1891, p. 314, t. 29, figs. 4, 5, 6.

This species recalls the Pacific forms of the genus rather than the Indian ones, its nearest ally being *T. nigritella*, which, however, is a larger shell with the last whorl much broader. Type in the Natural History Museum. (*Beddome.*)

T. kantavuensis Garrett. Pl. 20, figs. 25, 26, 27.

Shell widely umbilicated, thin, fragile, pellucid, depressed, lenticular, smooth, shining; incremental striæ fine, crowded, oblique; luteous-corneous, the periphery margined above and beneath with a reddish-chestnut line, the upper one following the whorls of the spire; suture with a depressed, narrow marginal line; whorls $6\frac{1}{2}$, slightly convex, rather rapidly increasing, last one not descending in front, acute and compressedly carinated, keel whitish; base more polished than above, convex; aperture very oblique, depressed, subrhomboid-lunate; peristome thin, straight above, margins converging, basal portion slightly thickened and gently arched. (*Garrett.*)

Alt. 7, diam. 20 mill.

I received several hundred examples of this very distinct species from a missionary who collected them in Kantavu Island. He

gave no information in regard to its station. Specimens sent to the Godeffroy Museum in Hamburg were referred to *T. swainsonii*, a Society Island species; and examples sent to an English correspondent were confounded with *T. metcalfei* Pfeiffer, a Philippine species. It is probably the *Helix* (*Videna*) *planorbis*, in "Dr. James C. Cox's Exchange List," which he accredits to Kantavu. The *T. planorbis* of Lesson was collected by that naturalist in New Guinea, and differs from our shell in being smaller, mottled with olivaceous, and in having only 5 whorls. A careful comparison with the description of *T. metcalfei* has convinced me that it cannot be the same as the Kantavu shell. *T. swainsonii* is smaller, thicker, rougher, much more variable, and the positions of the lineations are different. Its large size, depressed form, fragile texture, luteous horn color with the chestnut-brown marginal lines, and large umbilicus, will readily separate it from any other Vitian species. (*Garrett.*)

Kantavu Island, Viti Archipelago.

Tr. kantavuensis GARRETT, P. Z. S., Lond., 1887, p. 177.

My figure is drawn from a specimen from the author, kindly furnished by Mr. John Ponsonby, of London.

T. MORIO Tapparone Canefri. Pl. 30, figs. 15, 16.

Shell small, profoundly umbilicated, conic, carinated, rather solid, obliquely irregularly striated, pale rufous-corneous; spire convex-conic, apex obtuse. Whorls 6, convex, separated by a deep suture, slightly margined above; last whorl carinated at the periphery, not descending in front, a little compressed on the base. Aperture very oblique, depressed-lunate; peristome simple, acute; margins distant, and joined by a thin callus, basal and columellar margins somewhat thickened. Alt. 6, greater diam. 7, lesser 6 mill. (*T. C.*)

Ansus, Isl. of Jobi, Bay of Geelvink, New Guinea,

T. (*Nigritella*) *morio* T. C., Ann. Mus. Civ. Genov. (2) iv, p. 126 *bis*, t. 1, f. 8, 9, 1887.

This species resembles a miniature *T. ternatana*, but besides its much smaller size it is distinguished by the relative rudeness of the striæ, the depth of the sutures and the largeness of the umbilicus.

T. NIGRANS Smith. Pl. 30, figs. 29, 30, 31.

Shell widely umbilicated, depressed-conoid, chestnut colored with a pale hair line at the periphery and suture. Whorls 6, slightly

convex, sensibly increasing, little shining, sculptured with delicate growth lines; the last whorl acutely carinated, hardly descending in front, shining beneath. Umbilicus perspective, broad, deep. Aperture diagonal, subrhombic-lunar; peristome simple, acute, the upper margin obliquely arcuate, lower margin receding.

Alt. 7, greater diam. 17, lesser 15 mill. (*Sm.*)

Rossel Island, Louisiade Archipelago.

T. nigrans E. A. SMITH, Ann. Mag. N. H. (6) iv, p. 200, t. 13, f. 9–11, Sept., 1889.

This species approaches *T. papua* and *T. planorbis* and some other species in many respects; it may be recognized by the dark chestnut color and the white thread-like keel and suture. (*Sm.*)

T. RUBENS Hartman. Pl. 47, figs. 1, 2, 3.

Shell umbilicated, the umbilicus deep and tubular, one-seventh the diameter of the shell's base; thin but rather solid, lens-shaped, nearly equally convex above and below the acute, white-edged peripheral carina. Color light horny-buff, more or less tinged and obscurely streaked with tawny-brown, especially below suture and keel, and having a blackish red-brown band just above the white keel (and ascending the spire) and another immediately below the keel. Surface a little shining, lightly marked by growth-striæ, but having no spiral striæ. Spire convex, slightly conoidal, the apex pale, obtuse. Whorls 5½, a trifle convex, the last not descending, acutely keeled, a little concave just above the keel and more so below it, convex toward the middle of the base. Aperture ax-shaped, purplish-flesh colored inside; upper lip thin, straight, basal arcuate, becoming thickened at the well arched columella.

Alt. 6, greater diam. 14½, lesser 13 mill.

Aura Island, New Hebrides (Layard.)

Trochomorpha rubens HARTM., Proc. Acad. N. S. Phila., 1888, p. 251, t. 13, f. 5, 5a, 5b.

The figures and the above description are drawn from the type specimen, which is the individual figured on the plate of the Proc. A. N. S. Phila. cited above.

T. GODETI Sowerby. Pl. 30, figs. 26, 27, 28.

Shell openly umbilicated, the umbilicus one-fifth the diameter of the base; depressed, carinated, the carina acute in front, becoming quite obtuse on the latter part of the body whorl. Color tawny or

obscurely multilineate with tawny above, yellowish-corneous beneath, having a narrow dark chestnut band below and another above the periphery, the latter ascending the spire; periphery and suture pale. Surface having light growth lines but no spiral sculpture.

Spire convex, low; whorls 5½, slowly widening, separated by a shallow suture edged by a white line; last whorl slightly descending in front. Aperture very oblique, irregularly oval, purplish within; upper lip thin, arched forward; basal lip callously thickened, slightly subreflexed.

Alt. 7½, diam. 15 mill.; apert. alt. 6, width 7 mill.

Guadalcanar, Solomon Is.

T. godeti Sowb., P. Z. S., 1889, p. 578, t. 56, f. 10.

Belongs to the group of *meleagris* Pfr. and *partunda* Ang., but the umbilicus is much more widely open and the coloring differs. My description and figures are drawn from specimens received from Mr. Sowerby.

T. henschei Pfr. Pl. 20, figs. 28, 29, 30.

Shell perspectively umbilicated, the width of the umbilicus contained 5½ times in the diameter of the base; solid, opaque, slightly shining, buff-brown colored with five chestnut-brown bands, one a short distance below the suture, the next narrower, just above the white-edged, acute peripheral keel, the third wider, just below the keel, the fourth in the middle of the base, the fifth within the umbilicus. Surface having fine growth lines but no spiral striæ. Spire convex, apex obtuse; whorls 5½, slightly convex, separated by a slightly impressed, narrowly white-edged suture; the last whorl acutely keeled, with flattened base. Aperture very oblique, showing the bands within; upper lip arched forward, rather thin; basal lip slightly arcuate, thickened; columellar lip strongly arched.

Alt. 7, greater diam. 17, lesser 14½ mill.

Solomon Is.

Helix henschei Pfr., Mal. Bl. 1867, p. 197; Monogr. v, p. 495.

In figure 29 of my plate, the outer part of the basal lip should have been straighter and the columellar part more strongly arcuate. The above description and the figures are drawn from a specimen kindly supplied by my friend, John Ponsonby, of London. I see no difference whatever between this and the previously described *H. lüdersi* Pfr.

T. ZENOBIA Pfeiffer. Pl. 42, figs. 14, 15, 16.

Shell depressed, rather solid, opaque, tawny-brown, paler around the umbilicus, shining. *Umbilicus deep*, showing all the whorls, *one-sixth the greater diameter* of the shell.

Spire *conoidal*, apex obtuse. Earlier 2 whorls convex, shining, the following whorls slightly flattened above the suture, *slowly increasing, closely and strongly plicatulate-striate*, the striæ arcuate; last whorl convex above, acutely carinated; the base convex, shining, having light, arcuate growth striæ; no spiral lines either above or below. Aperture oblique, subrhombic, flesh-colored within; upper lip arcuate and arched forward; basal lip well arched, thickened, the columellar lip somewhat more strongly arcuate and *produced forward toward its insertion.*

Alt. 11–11½, greater diam. 24, lesser 21½ mill.; greatest width of aperture 11 mill.

Alt. 10, greater diam. 23, lesser 20 mill.

New Georgia, Solomon Is.

H. zenobia PFR., P. Z. S., 1863, p. 527; Monogr. v. p. 250.

This hitherto unfigured species is well distinguished by the striation of the upper surface, which is uncommonly strong and regular for a Trochomorpha. The shell figured is from the A. D. Brown collection (in Mus. Acad. Nat. Sci.); but we have also examined specimens in the exhibition series of the Academy, and from the collection of Mr. J. Ritchie, Jr., of Boston, the measurements last given above being taken from a shell in the Ritchie collection. Except in size the species varies but little.

T. CONVEXA Hartman. Pl. 30, figs. 20–25.

Shell umbilicated, the umbilicus deep and narrow, its width contained 6½ times in the diameter of the base; conoid-trochiform, the base rather flattened, periphery very acutely carinated. Base and carina and suture chestnut-brown, upper surface corneous-brown, becoming lighter above. Surface having delicate but obvious growth striæ.

Spire conoidal, its outlines convex; apex obtuse; suture hardly impressed. Whorls 6, very slowly widening, the last not descending, acutely keeled, slightly concave below the keel, then becoming gently convex, and passing suddenly into the umbilicus which is deep and straight-sided like a well. Aperture subrhombic, oblique, the lip thin and sharp; upper lip slightly arched forward, basal lip

receding; columellar lip strongly arcuate and a little calloused within. Alt. 6½, diam. 13 mill.

Aura Island, New Hebrides.

T. convexa Htm., Proc. Acad. Nat. Sci. Phila. 1889, p. 93, t. 5, f. 7.

My description and figures 20, 21, 22, are drawn from the type specimen in the collection of the Academy of Natural Sciences. Another specimen, figs. 23, 24, 25, differs in being higher (alt. 7¼, diam. 12 mill.), in having the umbilicus narrower, and in being somewhat lighter colored, showing more distinctly the narrow, pale-brown bands at suture and above and below the carina. This specimen is in the collection of Dr. Hartman.

T. planoconus Mousson. Pl. 47, figs. 4, 5, 6,

Shell umbilicated, trochiform, rather solid, scarcely shining, rugosely striated; striæ rude, irregular, oblique; color chestnut-black, variegated with fulvous, gradually passing into dark chestnut-brown; apex obtuse; base dark honey-yellow, with a darker line near the keel; spire elevated, conoid, with planulate outlines; suture linear, narrowly margined; whorls 7, slightly convex, slowly and regularly increasing, last one acutely carinated; keel compressed and rugose; umbilicus small, deep; aperture diagonal, subrhomboidal-luniform; peristome above the keel acute and gently arched, below the keel thickened and concave. (*Garrett.*)

Alt. 10, diam. 19 mill. (*Garrett*).

Alt. 11, diam. 18 mill. (specimen).

Ono Island, Viti Archipelago.

Tr. planoconus Mouss., *MS.*, Mus. Godeffroy 1885.—Garrett, P. Z. S., 1887, p. 175.

Distinguished from other similarly maculated species by its conical spire and flat base, the acute light-edged keel being rather bent downward. The umbilicus is deep and tubular, one-ninth the diameter of the base. The color is a clear, oily chestnut-brown below, with an obscure dark line bordering the keel; above it is black, becoming reddish and then yellow toward the corneous apex; the entire upper surface, except several earlier whorls, is maculated irregularly with creamy patches. The specimen described and figured is from the collection of Mr. John Ponsonby, of London.

T. merzianoides Garrett. Vol. IX, pl. 7, figs. 4, 5, 6.

The large size of this species, its honey-yellow base, chestnut-brown upper surface, which is mottled with radiating lines and

spots of a luteous-white color, will at once distinguish it. The upper surface is colored nearly the same as *T. merziana*, a Solomon Island species; but the present species may be separated by the absence of the basal band, darker color, the narrower last whorl, and its narrower aperture. *T. merziana* also differs in having the upper margin of the peristome inflected. (*Garrett.*)

Alt. 10, diam. 22 mill.

Vanua Levu, Viti Is., adhering to tree trunks.

H. (*Trochomorpha*) *merzianoides* GARRETT, Proc. Acad. Nat. Sci. Phila. 1873, p. 237, t. 3, f. 72; P. Z. S., 1887, p. 173.

This species, of which Garrett's types lie before me, is allied to *T. planoconus*, but differs in the color of the base, larger umbilicus, and broader contour. The last whorl is notably convex above on its latter part. The umbilicus readily exhibits all of the whorls, and measures about one-seventh the diameter of the base.

Vol. III, p. 81. *H. hermia* Hutt. is, according to Suter, no New Zealand shell but a Mauritian species.

Vol. III, p. 83. *H. lardea* Mts. is considered a var. of *planorbis* Less. by Bttg. (Ber. Senck. Ges. 1891, p. 262).

Vol. III, p. 83. *H. thieroti* de Morgan is probably a synonym of *H. timorensis* Mts. (v. Mlldff., P. Z. S. 1891, p. 334).

Vol. III, p. 90. *H. howinsulæ* Cox is a species of *Nanina*, and the type of the section *Epiglypta* Pils.

Vol. III, p. 92. For "*H. tavinniensis* Garrett," read *H. taviuniensis* Garrett.

Unfigured species of Trochomorpha.

T. SABÆA Martens, Nachr.-Bl. D. M. Ges. 1889, p. 146. Menaha, Southern Arabia, evidently belongs to the *Zonitidæ*.

T. RUFA Mlldff. ibid. 1888, p. 144. Mt. Tila, prov. Lepanto, Luzon, Philippines. Hidalgo (Obras i, p. 112) considers this a variety of *Tr. metcalfei*.

T. BOREALIS Mlldff. ibid. 1888, p. 39. Woods on the Mts. Omi, prov. Sytshuan, China, at 1000 meters alt.

T. SYNŒCIA v. Möll., ibid. 1891, p. 42. Siquijor, Philippines (= *T. planorbis* Less., teste v. Möll., Nachr.-Bl. 1892, p. 87).

T. STENOZONA Mlldff., Landschn. Cebu, p. 213. Luzon, Philippines (undescribed).

T. (VIDENA) BOETTGERI Mlldff., Nachr.-Bl. d. d. Mal. Ges. 1891, p. 201. Tablas and Romblon, Philippines (= *Tr. conomphala* Hidalgo, Journ. de Conch. 1887, p. 94, non Pfr.)

HELIX SWETTENHAMI de Morgan, Le Naturaliste, 1885, p. 68. Perak. May be a *Plectotropis*.

T. SUBTRICOLOR J. Mabille, Moll. Tonk. diagn. p. 7, May 14, 1887; Bull. Soc. Mal. Fr. iv, p. 96. Tonquin.

H. DICTYONINA Euthyme, Bull. Soc. Mal. Fr., ii, p. 257, 1885. Noumea, N. Caledonia. Probably a var. of *H. dictyodes* Pfr., or of *H. mouensis* Crosse.

TR. BINTUANENSIS Hidalgo, Obras Malacol. i, p. 116. Peñon de Bintuan, Busuanga, Philippines (*Quadras*). Closely allied to *Tr. splendens* Semp., but differing in the rapid increase of the last volution.

TR. CROSSEI Hidalgo, *l. c.*, p. 117. Same locality.

TR. BAGOENSIS Hidalgo, *l. c.*, p. 118. Banks of the river Bago, island of Negros, Philippines (*Quadras*).

T. THEMIS Garrett, P. Z. S. 1887, p. 177. Vanua Balavo and Oneata, Viti Is. (= *Tr.* (*Discus*) *lüdersi* Mouss., Journ. de Conch. 1870, p. 122, part, not of Pfr.).

TR. PULCHERRIMA Hartman, Proc. Acad. Nat. Sci. Phila. 1890, p. 228, pl. 3, f. 13 (N. Hebrides), belongs to the Zonitidæ.

HELIX SWETTENHAMI de Morgan, Le Naturaliste 1885, p. 68, is either a *Trochomorpha* or a *Plectotropis*.

TR. STAUDINGERI Ancey, Bull. Soc. Mal. Fr. vii, p. 145. Sangir Is. Allied to *Tr. lardea* Mts.

POECILOZONITES (III, p. 95). This group has been shown by the writer to belong to the *Zonitidæ*. See Proc. Acad. Nat. Sci. Phila. 1888, p. 285.

PRISTILOMA, Vol. III, p. 102. *H. lansingi* and *H. stearnsi* should be removed from the Helicidæ. They form the genus *Pristiloma* Ancey, in the *Zonitidæ*.

PELLA (Vol. III, p. 103). As constituted by Albers (Die Hel.), and followed by Pfeiffer (Nomencl. Hel. Viv.), and by Tryon, this group contains a number of very incongruous forms, as follows:

ZINGIS Martens, a group of *Zonitidæ*, contains *H. natalensis* Pfr. (*vide* Pilsbry, Proc. Acad. Nat. Sci. Phila. 1889, p. 279, pl. 9, figs. 11, 12), *cotyledonis* Bens., *trotteriana* Bens., *phytostylos* Bens., and possibly some other species. Ancey's name *Sheldonia* is a synonym.

H. hudsonia Bens., belongs to *Gallandia* Bgt., a group usually considered a section of *Vitrina*. The relations of this extensive group of globose Vitrinoid snails of South Africa urgently need investigation, but the soft parts only can give a clue to their affinities.

LEJEANIA Ancey, containing the thin, perforated species from Abyssinia, such as *H. darnaudi* Pfr., *isseli* Mor., *isselliana* Nev., *jickeli* Nev., *lejeaniana* Bgt., *achilli* Bgt., *d'hericourtiana* Bgt., etc. This group is hardly separable from *Fruticicola*.

NATALINA Pils. (= *Aerope* Alb., not Leach), a genus of *Rhytididæ*, consisting of agnathous forms having an umbilicated globose or depressed shell, plicate-striate above, polished beneath. This genus contains, besides its type, *H. caffra*, the following species: *H. knysnaensis* Pfr., *vernicosa* Kr., *tremeni* Melv. & Pons., *eumacta* Melv. & Pons., *dumeticola* Bens., *cosmia* Pfr., *omphalion* Bens. (Ann. Mag. (3) xiii, p. 494), and perhaps *Helix* (*Macrocyclis*) *carnotera* and *liparoxantha* Melv. & Pons. (Ann. Mag. N. H. 1892, p. 238). The anatomy is described and illustrated in my papers in Proc. Acad. Nat. Sci. Phila. 1889, p. 277, and 1890, p. 41.

Besides these, *H. cyclaria* Morel. and one or two other species belong elsewhere. When these are eliminated, we find that we have two groups of species remaining, one typified by *H. bisculpta*, the other by *H. menkeana*. These groups will now be considered in detail.

Genus PHASIS Albers, 1850.

Phasis ALB., Die Hel. p. 92 (1850), type and only species *H. menkeana* Pfr.—Not *Phasis* Walk., Cat. Lep. Het. B. M, ii, p. 312 (1854).

This group consists of umbilicated shells of solid, opaque texture, chalk-white with or without brown bands, the lip simple, dilated at the umbilical insertion; apical whorl corneous or dark. Of the group I have seen only *menkeana* Pfr. and *capensis* Pfr.; but *aitenhagensis* Kr. and *paludicola* Bens. apparently belong here also. The shells look like *Xerophila*.

The name *Phasis* is said by Agassiz (Nomencl. Zool.) to have been used by Hübner in 1816 for a genus of *Lepidoptera*, but the name was used for a *species* not a genus. See Zuträge zur Samml. exot. Schmetterl. p. 41 (1818).

Section TRACHYCYSTIS Pilsbry.

Pella ALB. (in part), Die Hel., edit. Martens, p. 84 (1860), type *H. bisculpta* Bens.—Not *Pella* Steph., Illustr. Brit. Ent., *Mandibulata*, vol. v, p. 434 (1832), a valid genus of Coleoptera.

Small shells, generally thin, somewhat translucent, horny or earthy brown in color, usually sculptured with fine oblique riblets; the lip simple and thin, dilated at the columellar insertion; umbilicus generally narrow.

These forms are evidently allied to *Phasis* in the dilated columella, etc. They have the appearance of some of the New Zealand Patuloid Helices, but the foot lacks parapodial grooves and caudal mucous pore. The jaw is ribbed; and the group is probably to be regarded as an odontognathous genus of the *Haplogona* of my arrangement of the Helices (Proc. Acad. Nat. Sci. Phila. 1892).

The following forms should be added to those described in Vol. III. See above, under *Pella*, for species to be removed to other groups.

Group of H. browningii.

P. BROWNINGII Benson. Vol. IX, pl. 6, figs. 1, 2, 3.

Shell narrowly umbilicated (*the width of the umbilicus contained 8½ times in the diameter of the shell*), rather depressed, thick lens-shaped; thin, *horn-colored, subtranslucent below, having radiating streaks above and below of light brown*, and close regular white riblets above; surface shining.

Spire low-conoid with slightly convex outlines and subobtuse but not flattened apex; suture moderate, crenulated. Apical whorl smooth, corneous, the next half whorl having fine, delicate striæ, the following whorls *sculptured with oblique, regular, thread-like riblets, which are white and slightly curved, numbering on the body whorl at periphery about 57*. These riblets are slightly strengthened as they pass over the peripheral angle, which is beautifully crenulated by them; but *immediately below this they become thin and delicate*, mostly lose their white color, and to the naked eye disappear; but under a lens they may be seen continuing to the umbilicus.

Whorls 4½, slightly convex, slowly increasing, the last rather obtusely keeled at the periphery, compressed just below the keel. Aperture but little oblique, rhomboidal; peristome thin, strongly curved at the outer part and where it joins the columella; columellar lip dilated above. Alt. 3⅓, diam. 5 mill.

Cape Point, South Africa.

Helix browningii Bens., Ann. & Mag. N. H. (3) xiii, p. 493.—Pfr., Mon. v, p. 178.

The specimen described above and figured on my plate is from the original locality. *H. erateina* Melv. & Pons. should be compared, but it differs in the somewhat more compressed keel and smaller size.

Benson says that this species is smaller than *H. prionacis*, with the same number of whorls; the plication is closer, less deep, and more regular, and extends only just below the angulate periphery, instead of to the umbilicus, which is wider in *prionacis*. In the latter species the periphery is more compressed, the rufous-brown markings are more disposed to be spotted than strigate, and do not extend to the lower side as in *H. browningii*.

P. prionacis Benson. *Unfigured.*

Shell umbilicated, conoid-depressed, above and below strongly obliquely plicate, the plicæ remote, whitish; whitish-horny, here and there ornamented with brown spots. Spire conoid, suture impressed, apex slightly obtuse. Whorls 5, slightly convex, narrow, the last compressedly carinated, convex below. Aperture wide lunate, ax-shaped; peristome thin, acute, columellar margin expanded, dilated above. Alt. 3, greater diam. 6, lesser 5 mill. (*Bens.*)

Bredasdorp, South Africa.

Helix prionacis Bens., Ann. Mag. N. H. (3), xiii, p. 493, 1864.—Pfr., Mon. v, p. 183.

See notes under *H. browningii*.

P. erateina Melvill & Ponsonby. Pl. 35, fig. 11.

Shell deeply but narrowly umbilicated, lenticular, depressed-conic. Whorls 5, ashy, begirt obliquely with close regular lamellose riblets, and decorated with longitudinal rufous flammules; having a crenulated appearance at the sutures; last whorl serrate-carinate at the

periphery. Aperture subquadrate; peristome simple, a little reflexed at the columellar margin.

Alt. 2·25 diam. 3 mill. (*M. & P.*)

Bredasdorp, in sand under stones, *and Cape Point, S. Africa.*

Helix (*Pella*) *eruteina* M. & P., Ann. Mag. N. H. (6), ix, p. 88, t. 5, f. 3.

A most elegant and beautiful little shell, found, as noticed above, by Mr. Layard in two localities; we have taken the *Bredasdorp* specimen as the type. Though minute, the sculpture is most elaborate, with fine oblique lirulæ extending over the entire surface. The umbilicus is deep, though narrow, last whorl serrately keeled, aperture somewhat square, lip simple. (*M. & P.*)

This species should be carefully compared with the *H. primoeis* and *H. browningii* of Benson, both of which are very closely allied.

P. LYGÆA Melvill & Ponsonby. Pl. 35, fig. 7.

Shell profoundly but narrowly umbilicated, horny, thin; spire depressed-conoid; whorls 6, the last acutely carinated, closely and regularly obliquely striated above and below; aperture lunar; peristome simple, reflexed at the base, and forming a triangular lamina at the columella. Alt. 7, diam. 12 mill. (*M. & P.*)

Natal (Lightfoot.)

Helix (*Pella*) *lygæa* M. & P., Ann. Mag. N. H. (6), ix, p. 85, t. 4, f. 7 (Jan., 1892.)

A conspicuous species, but one which we have not seen in good live condition. It is of the same horny and striated character of whorl as the last two species, much resembling *H. lens* Fér. in miniature, but the outer lip is not so strongly expanded nor developed as in that species. (*M. & P.*)

Group of H. bisculpta.

P. AULACOPHORA Ancey. Pl. 43, figs. 60, 61.

Shell narrowly umbilicated, globose-depressed, rather thin, pale horny-brown colored, lusterless. Spire low-conoidal, apex obtuse; sutures well impressed. Whorls $4\frac{1}{2}$, convex, the first smooth, the rest closely plicate-striate, slowly increasing; the last whorl very convex beneath, and having the cuticular folds more delicate and crowded on its latter portion; on the base these riblets are radiating; on the upper surface they bend obliquely backward, and make a

broad bow-shaped sweep on the convexity of the whorl. Aperture lunate, oblique; peristome thin, simple, well expanded at the columellar insertion.

Alt. 3, greater diam. 4½, lesser 3½ mill.; alt. apert. nearly 2 mill.
Alt. 3·7, greater diam. 4·6 mill.

South Africa.

Helix aulacophora Ancey, Bull. Soc. Mal. Fr. vii, p. 158, 1890.

This small species belongs to the typical group of *Pella*. It is more elevated than *P. rariplicata*, with narrower umbilicus and closer riblets, but in *P. bisculpta* the riblets are much finer and closer still, and the spire less conoidal.

The specimens described and figured were received from Mr. John Ponsonby, of London.

P. tabulæ Chaper. Pl. 43, figs. 52, 53.

Shell of the same size and general form of *H. capensis* Pfr.; whorls globulose but a little less enveloping; spire less high, shell thinner. Sculpture consisting of crowded, regular striæ of growth covering whole surface; the striæ being whitish, the interspaces pale brown varying in intensity. The nucleus is shining and brighter brown; the striæ beginning after the first one or one and one-half whorls, the next two whorls being nearly white; but the general color is darkened by the deepening in intensity of the color of the interspaces between the striæ.

Table Mountain, Cape Town.

Helicopsis tabulæ Chaper, Bull. Soc. Zool. Fr. 1885, p. 483, t. 11, f. 4, 5.

Chaper, from whom the above description is taken, states that he collected this species when taking a rapid walk up Table Mountain. The thinness of the shell is explained by its habitat on this plateau of gray quartzite.

P. bathycœle Melvill & Ponsonby. Pl. 35, fig. 13.

Shell minute, very profoundly umbilicated, thin, horny-greenish, planorbiform, the apex nearly immersed; whorls 6, convex, impressed at the sutures, encircled with regular longitudinal lirae; the last whorl rapidly increasing, effuse below; peristome thin, simple; aperture lunar. Alt. 1½, diam. 2½ mill. (*M. & P.*)

Cragie Burn, Somerset East, S. Africa, under dead leaves in the bush. (Miss M. L. Bowker.)

H. (*Pella*) *bathycale* M. & P., Ann. Mag. N. H. (6) ix, p. 89, t. 5, f. 4.

Conspicuous for its flattened upper whorls, as well as its deep perspective umbilicus; the whole surface of the shell being decorated with fine longitudinal liræ.

P. BURNUPI Melvill & Ponsonby. Pl. 35, fig. 5.

Shell profoundly and narrowly umbilicated, depressed; brownish-horny, satiny, thin, somewhat pellucid. Whorls 4, convex, closely, obliquely, longitudinally ribbed-plicate throughout; at the sutures compressed; the last whorl compressed, semi-convex below. Spire depressed, apex obtuse. Aperture obliquely lunar, thin; peristome simple, reflexed at the umbilicus.

Alt. 5, diam. 7 mill. (*M. & P.*)

Cope's Folly, near Maritzburg, S. Africa.

Helix (*Pella*) *burnupi* M. & P., Ann. Mag. N. H. (6), ix, p. 239, t. 13, f. 6 (Sept., 1892.)

More depressed than *H. bisculpta* Benson, but of allied character, the whorls being very finely obliquely costoplicate, compressed at the sutures, the somewhat oblique mouth thin, reflected at the columellar margin near the umbilicus, which is deep, but narrow. Several specimens. (*M. & P.*)

P. LIRICOSTATA Melvill & Ponsonby. Pl. 35, fig. 9.

Shell slightly depressed, rugulose, thin, corneous, olive-blackish, encircled by close, irregular liræ; whorls 4, rapidly increasing; umbilicus deep, exceeding one-third the diameter of the shell; aperture lunar, peristome simple, straight, thin.

Alt. 1½, breadth 2½ mill. (*M. & P.*)

East Griqualand, S. Africa.

Helix (*Pella*) *liricostata* M. & P., Ann. Mag. N. H. (6), viii, p. 239; ix, p. 94, t. 5, f. 1.

An extremely interesting little species of dark horny texture throughout, beautifully longitudinally sculptured with oblique, radiating liræ. This shell is allied to *H. rirularis* Krauss, judging from his figure, but we have not examined the shell itself. (*M. & P.*)

P. HOTTENTOTA Melvill & Ponsonby. Pl. 35, fig. 8.

Shell small, deeply but narrowly umbilicated, globose-depressed, olivaceous-horny, thin; lirate with close, oblique striæ, here and there thicker, as if varicose. Whorls 4½, a little convex, the last subeffuse. Aperture lunar-ovate; peristome very thin, columellar margin reflexed. Alt. ¾, diam. 1¼ mill. (*M. & P.*)

Port Elizabeth, S. Africa.

Helix hottentota M & P., Ann. Mag. N. H. (6), viii, p. 239; ix, p. 94, t. IV, f. 6.

An extremely minute, thin, horny, subpellucid shell, olive-brown in color, very deeply though somewhat narrowly umbilicate, very finely obliquely close-ribbed throughout (but this is barely distinguishable without a lens); the plications of the striæ are occasionally thicker, giving here and there an appearance of varices; lip simple, very thin, columellar margin slightly reflected at the umbilicus. This species cannot be confounded with any other from South Africa which has yet come under our notice. (*M. & P.*)

P. RHYSODES Melvill & Ponsonby. Pl. 35, fig. 2.

Shell deeply but narrowly umbilicated, depressed-convex, thin, horny-brownish; at the apex flattened. Whorls 5, compressed toward the sutures, obliquely begirt with irregular, whitish, longitudinal liræ; last whorl hardly angled in the middle. Aperture lunar-ovate; peristome simple, thin, reflexed at the columellar margin. Alt. 4, diam. 6 mill. (*M. & P.*)

South Africa (E. L. Layard.)

Helix (Pella) rhysodes M. & P., Ann. Mag. N. H. (6) ix, p. 87, t. 4, f. 2.

Unfortunately Mr. Layard has no record of the precise habitat of this little species, of which there are three specimens, two being hardly full-grown, and consequently smaller than that selected for the type. It falls under the *H. biseulpta* section of *Pella*, considered typical in Tryon's Manual while it is there mentioned that the name *Sheldonia* has been employed by Ancey (1887) for such species as *natalensis, trotteriana,* and *cotyledonis.* (*M. & P.*)

H. rhysodes is thin, horny, fuscous, five-whorled, with white oblique liræ longitudinally crossing, somewhat irregularly, there being here and there small spaces left quite clear and free; and the shell presents a wrinkled appearance in consequence. The umbilicus is deep,

but narrow; mouth lunar-ovate, lip a little reflexed at the columellar margin. (*M. & P.*)

Group of H. planti.

P. PLANTI Pfr. (Vol. III, p. 105). Pl. 43, figs. 57, 58, 59.

Dohrn, in refiguring this species (Contin. Conchyl. Cab., p. 622, t. 178, f. 29, 30, 31) remarks that although Pfeiffer calls the species "longe pilosa," he cannot substantiate the statement, for it has no hairs or bristles, but only strips of the membranous cuticle which have become detached from the riblets, and look like hairs.

This peculiarity, with the lower situation of the peripheral angle, will separate *Planti* from *Africæ*.

P. AFRICÆ A. D. Brown. Pl. 43, figs. 55, 56.

Shell very narrowly umbilicated (the umbilicus about one-eighteenth the diameter of the shell), depressed above, convex below, obtusely angular at the circumference; thin and rather fragile, light horn-color, nearly lusterless.

Spire slightly raised, the apex small, raised; the first whorl smooth, following whorls sculptured with delicate, spaced cuticular laminæ, hardly seen except under a lens, and becoming more widely spaced and more inconspicuous on the last whorl; under a strong lens the surface is seen to be very closely and extremely finely spirally striated both above and below. Whorls 5, slightly convex, the last subangular, convex below, not descending.

Aperture but little oblique, lunate-oval; outer lip thin, a little expanded; columellar lip arcuate, broadly reflexed, partly concealing the umbilicus.

Alt. 6, diam. 9·6 mill. Adult specimen.

Alt. 5·5, diam. 8·5 mill. Adult specimen.

Great Brakke, South Africa.

H. africæ A. D. BROWN, Amer. Journ. Conch. i, 1865, p. 136.—PFR., Monogr. vii, p. 459; Conchyl. Cab., p. 527, t. 162, f. 8, 9.

This species differs from *H. planti* as described by Pfr. in lacking hairs, and from the same species as figured by Dohrn, in having the peripheral angulation situated higher on the whorl. The membranous riblets are a trifle ragged on the edges, but in none of the eight specimens before me are there any hairs. The above description is from Brown's types, now in the collection of the Academy.

P. ACTINOTRICHA Melvill & Ponsonby. Pl. 35, fig. 14.

Shell covered but profoundly umbilicated, above planate-depressed; pellucid, horny, thin. Apex turbinate. Whorls 5, impressed at the sutures, a little convex, covered throughout with a horny epidermis, striate-lirate. The last whorl begirt by 4 lines of bristles, those at and below the periphery long, on the base shorter, and shortest around the umbilicus. Aperture semi-lunar, peristome thin, columella angulated below, triangularly reflexed at the umbilicus. Alt. 5·5, diam. 9 mill. (*M. & P.*)

Maritzburg, South Africa.

Helix (*Pella*) *actinotricha* M. & P., Ann. Mag. N. H. (6), ix, p. 238, t. 13, f. 5 (Sept., 1892.)

A most attractive little species, perhaps not quite adult; of a delicate horny substance and color, very flattened at the periphery and above, and with the apex of the last whorl somewhat turbinate. The whole shell covered with a pale horny epidermis, everywhere striate-lirate. Around the periphery most of these striæ bear long bristles or setæ which extend around the shell; just below also a second series occurs, and further toward the base are two more series, one with very short setæ about midway and the other nearer the umbilicus; in this the bristles are shorter still. We know no species at all nearly resembling this. Two specimens. (*M. & P.*)

P. TRICHOSTEIROMA Melvill & Ponsonby. Pl. 35, fig. 3.

Shell very narrowly but profoundly umbilicate, corneous brown, a little convex, nearly smooth; longitudinally obliquely delicately striate, and all over decussated by very minute spiral lirulæ. Whorls 5, the last carinated in the middle, the carina furnished with short hairs. Aperture lunar-ovate; peristome simple, reflexed at the columellar margin. Alt. 5½, diam. 7½ mill. (*M. & P.*)

Port Elizabeth, S. Africa.

Helix (*Pella*) *trichosteiroma* M. & P., Ann. Mag. N. H. (6), ix, p. 84, t. 4, f. 9.

Judging from the description of *Helix petrobia* Benson recorded from High Constantia, Cape of Good Hope, but of which we have not been able to examine the type, the species under discussion would seem to differ chiefly in the acutely angled keel, fringed with regular, short epidermal hairs, also in the form being more convex, color dull brown, with no fulvous tinge, and other minor distinctions. (*M. & P.*)

Group of H. turmalis.

P. TURMALIS Morelet. Pl. 43, figs. 53, 54.

Shell perforated, depressed-conoid, costulate above, striatulate beneath; corneous-rufescent, hardly shining. Whorls 5, little convex, the last compressed, obsoletely angulated. Aperture oblique, compressed-lunar; peristome simple, thin, straight, the columellar margin slightly dilated at the insertion.

Alt. 3, greater diam. 5, lesser 4½ mill. (*Morel.*)

Port Elizabeth, S. Africa.

Helix turmalis MOREL, Journ. de Conch. 1889, p. 5, t. 1, f. 1.

This species resembles *H. plebeia*, *H. sericea*, etc. of Europe. The last whorl is depressed, feebly angulated, and pierced by a very narrow but deep umbilicus. The rounded aperture is also a little depressed, its margin thin, sharp, terminations separated. The shell is thin, horny brownish, lusterless, very coarsely costulate above, finely striate beneath. (*Morel.*)

P. INOPS Morelet. Pl. 43, figs. 50, 51.

Shell imperforate, depressed turbinate, rather solid, reddish or buff-horny. Spire conoidal, apex subacute; whorls 5½, the first smooth, the last subdepressed, irregularly striated, the striæ finer beneath. Aperture obliquely lunar, margins remote, straight, the columella angularly revolute above.

Alt. 4, greater diam. 5, lesser 4 mill. (*Morel.*)

Port Elizabeth, S. Africa.

H. inops MOREL., Journ. de Conchyl. 1889, p. 6, t. 1, f. 2.

More globular than *H. turmalis*, and imperforate. The columella has a triangular dilation above. The shell is lusterless, yellowish on the earlier whorls, passing on the last two whorls to a dark red; engraved with relatively large, sinuous and quite regular grooves. It differs from *H. uitenhagensis* Krauss in wanting the umbilicus, etc.

P. MINYTHODES Melvill & Ponsonby. Pl. 35, fig. 15.

Shell very narrowly but profoundly umbilicated, globose-depressed, smooth, little shining, horny. Whorls 4, obscurely striated, the last subconvex, compressed at the sutures. Aperture lunar-ovate, peristome thin, triangularly reflexed at the columellar margin. Alt. 8, diam. 11 mill. (*M. & P.*)

Craigie Burn, South Africa.

Helix (*Pella*) *minythodes* M. & P., Ann. Mag. N. H. (6), ix, p. 240, t. 13, f. 8.

A neat, horn-colored shell, with a very thin, almost smooth epidermis, without gloss. Whorls depressed, very obscurely striated; peristome thin, triangularly reflexed over the umbilicus, which is very narrow but deep; mouth slightly squamose at the base. Three specimens. (*M. & P.*)

P. CONISALEA Melvill & Ponsonby. Pl. 35, fig. 4.

Shell semi-pellucid, thin, narrowly umbilicated, whitish, orbiculate-depressed; spire convex; whorls 5, convex, narrow, the last longitudinally densely lirate, and covered all over with a very thin silky-setose epidermis, the setæ short, regularly situated upon the liræ, and so disposed as to give the aspect of transverse lines. Aperture lunar-oblong, patulous; peristome thin, membranous, reflexed at the columellar margin. Alt. 5, diam. 6½ mill. (*M. & P.*)

Maritzburg, South Africa.

Helix (*Pella*) *conisalea* M. & P., Ann. Mag. N. H. (6), ix, p. 239, t. 13, f. 7.

A little shell with the aspect of the British *H. hispida* L. or *sericea* Müll.; but when examined with a lens the whole pellucid surface is seen to be covered with a delicate epidermis and upon the longitudinal liræ are ranged with regular precision crowded short setæ, so straightly disposed as to give the effect of transverse lines. The whorls are convex, five in number; umbilicus small, lip thin, reflexed at the columellar margin over the umbilicus. Superficially the shell has a dusty appearance suggesting the trivial name. Several specimens. (*M. & P.*)

P. TUGURIOLUM Melvill & Ponsonby. Pl. 35, fig. 1.

Shell covered umbilicate, thin, whitish horn colored, subplanate, swollen beneath. Whorls 5, longitudinally very indistinctly striated, transversely delicately and minutely concentrically decussated, aperture lunar ovate; peristome simple, a little reflexed at the columellar margin. The largest specimen measures:

Alt. 6, diam. 8½ mill. (*M. & P.*)

South Africa (Layard.)

Helix (*Pella*) *tuguriolum* M. & P., Ann. Mag. N. H. (6), ix, p. 88, t. 5, f. 5.

Three specimens, of which two are perfect; a plain, smoothish, horny shell, bearing indistinct lines of longitudinal ribbing (when closely examined with a lens), very minutely decussated by spiral striæ. Allied to *H. Lovéni* Krauss, represented by only a poor specimen in the National Collection, South Kensington, from which this species seems to differ chiefly in the absence of any keel at the periphery, and likewise in there being no sign of epidermis, which in *H. Lovéni* adheres to the ribs and renders them more conspicuous. (*M. & P.*)

P. EPETRIMA Melvill & Ponsonby. Pl. 35, fig. 6.

Shell narrowly umbilicated, depressed, thin, corneous, subpellucid; all over closely striatulate, striæ oblique, regular; spire depressed-convex; whorls 4, slightly convex, impressed at the sutures, the last whorl rapidly increasing. Aperture lunar; peristome simple, acute, shortly triangularly reflexed at the columellar margin. Alt. 3, diam. 4½ mill. (*M. & P.*)

Somerset District, South Africa.

Helix (*Pella*) *epetrima* M. & P., Ann. Mag. N. H. (6), ix, p. 84, t. 4, f. 3.

Allied to *H. bisculpta* Benson, from which this little species differs in its whorls being more discoid, greater depression of spire, and smaller size; the system of sculpture, so far as the closely ranged longitudinal striæ are concerned, though apparently identical, is found upon examination with a strong lens to be far more clearly and finely developed in *H. bisculpta*, the striæ in that species looking like finely cut serrations round the edge of the periphery while in *H. epetrima* they are barely perceptible and the edge of the shell looks ragged in comparison. (*M. & P.*)

P. CRAWFORDI Melvill & Ponsonby. Pl. 35, fig. 10.

Shell narrowly umbilicated, globose-depressed, hyaline, shining above, olivaceous-satiny beneath, entirely smooth all over; spire slightly raised, apex obtuse; whorls 5, slightly convex. Aperture lunar, lip simple, acute, columellar margin suberect, widely reflexed above, forming a triangular lamina as in *H. bisculpta*.

Alt. 11, diam. 16 mill. (*M. & P.*)

Port Elizabeth, S. Africa.

Helix (*Pella*) *crawfordi* M. & P., Ann. Mag. N. H. (6), vi, p. 469; ix, p. 94, t. 4, f. 4.

A very distinct, large, smooth whorled snail, not easily to be compared with any other Cape species. (*M. & P.*)

P. FARQUHARI Melvill & Ponsonby. Pl. 35, fig. 12.

Shell small, umbilicated, thin, ashy-horn colored; whorls 4, all over longitudinally pitted-rugose, a little graduate, slightly ventricose, the apex papillar. Aperture rounded; peristome thin, simple.

Alt. 2, diam. 3 mill. (*M. & P.*)

Port Elizabeth, South Africa.

Helix (*Pella*) *farquhari* M. & P., Ann. Mag. N. H. (6), ix, p. 240, t. 13, f. 9. (Sept., 1892.)

A very minute species, somewhat recalling *H. rupestris* of Europe. The surface is ashy corneous, irregularly wrinkled with oblique lines longitudinally; whorls 4, somewhat angled, and simple mouth. (*M. & P.*)

P. STROBILODES Melvill & Ponsonby. Pl. 43, fig. 62.

Shell covered-umbilicate, conical, thin, dull white, covered with a silky horn-colored cuticle. Whorls 6, narrow above, rapidly increasing, below at the base a little ventricose. Aperture lunar, peristome thin, simple, triangularly reflexed at umbilicus.

Alt. 5½, diam. 7¾ mill. (*M. & P.*)

Tharfield, South Africa.

Helix (*Pella*) *strobilodes* M. & P., Ann. and Mag. N. H. (6), xi, p. 19, t. 3, f. 1. (Jan., 1893.)

A somewhat conical, closely whorled shell, with simple mouth and narrow umbilicus. Allied to *H. loveni* Krauss. Two specimens. (*M. & P.*)

Unfigured species of Trachycystis.

HELIX GLANVILLIANA Ancey, Bull. Soc. Mal. Fr. vii, p. 157 (1890). Graham's town, eastern district of Cape Colony. Allied to *aulacophora*, but smaller, etc.

MACROCYCLIS (Vol. III, p. 109.)

The Australian species, *franklandiensis* Fbs. (of which *R. beddomei* Braz., vol. I, p. 126, is said by Ponsonby to be a synonym), *harrietta* Cox and *ramsayi* Cox (p. 110), should be removed from *Macrocyclis* and placed in the genus RHYTIDA (Vol. I, p. 117.)

Genus HELIX Linné.

Subgenus GONOSTOMA (Vol. III, p. 114.)

H. ANNAI Paladilhe. Pl. 43, figs. 47, 48, 49.

Placed by Tryon under *H. lenticula* as a variety in Vol. III, p. 119. Specimens sent by Mr. John Ponsonby show that it is a well-defined species. The shell is umbilicated, width of umbilicus contained about 4⅓ times in greatest diameter of the shell (in *lenticula* nearly 6 times); form depressed, slightly convex above, *roundly* angled at the periphery, which is *near the top of the whorl*, the base very convex. Surface very finely striated (not regularly and coarsely costulate as on the spire of *lenticula*). Whorls 4½, *convex, slowly increasing*. Aperture oblique, narrow; *lip thin, not in the least thickened or expanded*. Alt. 3, diam. 6½ mill.

Tangier.

Helix annai PAL., Rev. et Mag. Zool. 1875, p. 82, t. 6, f. 13–18.

Mr. Ponsonby writes: "I have collected many, both at Tangier and near Gibraltar. They never seem to be larger or fuller grown, nor to have any tendency toward *H. lenticula*." To which it may be added that the young are perfectly distinct from young *lenticula*.

H. COLUMNÆ Ponsonby. Pl. 34, figs. 82, 83, 84.

Shell broadly and openly umbilicated, depressed, nearly circular in circumference, lenticular, surrounded by an acute carina; spire depressed, conic, narrow whorled, apex minute, slightly flattened; rather solid, little translucent, unicolored corneous-brown, paler beneath. Whorls 8, very slowly increasing; suture impressed, at first linear, then subcrenate; earlier whorl smooth, convex; following a trifle convex, very distinctly sculptured with distant, arcuate riblets. Last whorl scarcely dilated, the basal convex, begirt with an acute serrated carina a little above the middle, costellate above, smoother and striated below, slightly descending in front. Aperture oblique, produced above, receding below, irregularly lunate-ovate, angled outwardly; peristome thin, lipped with whitish, the margins distant, upper margin straight, acute, lower margin reflexed, thickened, columellar margin a little dilated at the insertion. (*Kob.*)

Alt. 10, greater diam. 20, lesser 18 mill.

Top of Apes' Mt., opposite Gibraltar.

Helix (*Gonostoma*) *columnæ* Pons. mss., KOBELT, Nachr. D. M. Ges. xxi, 1889, p. 140; Rossm. Icon. N. F., p. 79, t. 111, f. 662.

No specimens of *H. lenticularis* approach this species in sculpture.

H. WALKERI Ponsonby. Pl. 34, figs. 79, 80, 81.

Shell openly and deeply umbilicated, depressed, carinated, the spire depressed-conic, narrow whorled, apex fine, lightly flattened; rather thin, pellucid, deep horn-brown. Whorls 8, very slowly increasing, a little convex, separated by an impressed linear suture; pretty regularly sculptured with arcuate, subdistant riblets. Last whorl not dilated, convex on the base and striatulate, having an acute but scarcely compressed carina; not descending in front. Aperture very oblique, crescentic, angulate outwardly; peristome thin, margins distant, joined by a very slight parietal callus, upper margin straight, basal reflexed, lightly white-lipped, columella impressed in the umbilicus, hardly dilated at the insertion. (*Kob.*)

Alt. 8, greater diam. 14, lesser 13 mill.

Near Esmir, coast of Morocco.

H. (*Gonostoma*) *walker* Pons. *MSS.*, KOBELT, Nachr. D. M. Ges. 1889, p. 140; Rossm. N. F. iv, p. 79, t. 111, f. 663.—WESTERL. Fauna Paläarct. Binnenconch. suppl., p. 14.

This is probably a variety of *H. tarnieri* in which the peripheral keel extends entirely around the body-whorl to the aperture.

H. SUPRACOSTATA Kobelt. Pl. 34, figs. 76, 77, 78.

Shelt narrowly and nearly covered umbilicate, acutely carinated, convex above and below, lenticular, convex above and very distinctly sculptured with rather distant curved riblets; inflated-convex and smoother, striatulate below; corneous-whitish covered with a deciduous brown cuticle. Spire regularly depressed-convex, apex minute, corneous. Whorls 7–8, slightly convex, very slowly increasing, separated by an impressed suture crenulated by the riblets; last whorl scarcely wider than the penultimate, begirt by an acute obsoletely serrated carina, inflated beneath, hardly descending in front. Aperture oblique, irregularly rhomboidal, narrow, deeply lunate; peristome biangulate (lower angle less distinct), upper margin slightly thickened, outer margin straight, lipped within and more or less distinctly toothed, basal margin reflexed subarcuate, impressed in the umbilicus nearly covering it. (*Kob.*)

Alt. 7, diam. 13 mill.

Mts. of Beni Hoznear, near Tetuan, Algieria.

Helix (*Gonostoma*) *supraplicata* Kob., Nachr. D. M. Ges. 1882, p. 123; Rossm. Icon. N. F. iv, p. 15, t. 95, f. 530.

This species agrees in the aperture with *H. gougeti* Terv., in sculpture with *H. tarnieri* Morel. In the umbilicus it approaches *H. buvignieri* Mich. (*asturica* Pfr.), but it is always somewhat open.

H. BLANCI Pollonera. Pl. 43, fig. 43.

Shell flattened, openly umbilicated, brown, pilose; the spire immersed in the middle. Whorls 6, convex, the penultimate a little projecting. Aperture vertical, triangular, trisinuate; basal lip incurved, the outer lip having a thick tooth.

Bassano and Schio, in Venetia, N. Italy.

H. blanci Poll., Atti della Soc. Ital. di Sci. Nat. xxvii, p. 78, fig.

This form is intermediate between *H. obvoluta* and *H. holoserica*.

H. UNINODATA Gredler, Nachrichtsbl. D. M. Ges. 1890, p. 36. *Unfigured.* China. Somewhat allied to *H. binodata* Mlldff.

POLYGYRATIA (Vol. III, p. 124.)

P. QUINQUELIRATA Smith. Pl. 42, figs. 25–28.

Shell discoidal, slightly convex above, narrowly, umbilicated beneath, thin, greenish-yellow, shining. Whorls 7, slowly increasing, convex, striated with growth-lines, indistinctly concave above the periphery, scarcely descending in front, provided with three unequal, light internal folds, and two strong parietal laminæ; aperture semilunate, small; peristome thin, scarcely expanded.

Alt. 3, greater diam. 6, lesser 5½ mill. (*Sm.*)

North end of Fernando Noronha and on Platform Island.

Helix (*Ophiogyra?*) *quinquelirata* E. A. Smith, Journ. Linn. Soc. Lond. xx, p. 500, t. 30, f. 7–7*c*.

H. JANEIRENSIS Pfr. (Zeitschr. f. Mal. 1851, p. 128; Mon. iii, p. 265) from *Rio Janeiro* (Macgillivray), seems to belong to the group of *H. heligmoidea* and *cheilostropha* Orb. It has not been figured.

H. HELICYCLOIDES Orb. Vol. III, pl. 26, figs. 10, 11, 12.

The descriptions given by Pfeiffer in the Monographia iii, p. 107 and iv, p. 310 do not apply to this species. It is described by d'Orbigny as thin, nearly diaphanous, *very strongly striated transversely above,* nearly smooth beneath; last whorl descending

toward the aperture, and on its last third constantly marked on the convex side, by a strong depression; lip visibly thickened but not reflexed. Alt. 5, diam. 16 mill. It was collected in the humid forests covering the foot of the eastern chain of the Bolivian Andes, north of Cochabamba.

The figures in Fér. Hist., t. 69*B*, f. 3 are copied from Orbigny's plate; Reeve figures and describes the true *helicycloides*.

Genus POLYGYRA (Vol. III, p. 128.)

P. AURICULATA var. MICROFORIS Dall (p. 138), not *microformis*.

P. DISSECTA Martens. Pl. 42, figs. 21–24.

Shell narrowly and deeply umbilicated, subdepressed, lightly striatulate, tawny-corneous, somewhat shining; spire shortly conoid: whorls 5½, slightly convex, the last rounded with very convex base; deflexed and constricted behind the aperture. Aperture very oblique, wide-lunate; peristome reflexed, white; parietal wall provided with a rather simple oblique fold; outer margin having two low subelongate denticles, parallel to the margin and separated by a narrow triangular slit; basal margin having one obtuse small denticle. (*Mts.*) Alt. 3½, greater diam. 9, lesser 7½ mill.

Toluca, central Mexico.

Polygyra dissecta MTS., Biol. Centr. Amer., Mollusca, p. 167, t. 7, f. 7, 7*a-c*.

Described from one specimen. In general appearance very like *H. plagioglossa*, but to be distinguished by the two laminar teeth on the outer margin.

P. RICHARDSONI Martens. Pl. 42, figs. 17–20.

Shell obstructedly umbilicated, subdepressed, lightly striatulate, tawny-brown, slightly shining; spire shortly conoid; whorls 5, slightly convex, the last rounded, very convex beneath, at the aperture distinctly striated, deflexed and constricted. Aperture very oblique, lunate; peristome reflexed, white; parietal wall provided with an unequally two-limbed fold, outer lip with a moderate obtuse tooth, prolonged upward into a lamina parallel with the margin; basal margin having one vertical, subcompressed, moderate tooth. (*Mts.*) Alt. 4–5, greater diam. 9–11, lesser 8–9½ mill.

Presidio de Mazatlan, State of Sinaloa, Mexico.

Polygyra richardsoni MTS., Biol. Centr. Amer. Moll., p. 168, t. 7, f. 9, 9*a-c*. (April, 1892.)

Near *P. triodontoides* Bld., but with the umbilicus still more obstructed, only the last part of the penultimate whorl visible within it (as in *P. ariadnæ*), the basal and external tooth nearer to each other, and the latter more distinctly prolonged upward into a lamina. (*Mts.*)

P. DORFEUILLEANA var. SAMPSONI Wetherby.

Differs from the type in having the umbilicus formed by the last whorl much wider. It is more commonly found than the true *dorfeuilleana* in Arkansas and Indian Territory.

P. JACKSONI var. DELTOIDEA Simpson.

Front margin of the parietal fold strongly elevated.

Indian Territory.

SCULPTARIA Pfr. (Vol. III, p. 138.)

A group of unknown affinities.

S. CHAPMANNI Ancey, Bull. Soc. Mal. Fr. vii, p. 156, (*unfigured*). Walwich Bay, Ovampoland.

HELIX RETISCULPTA Martens, Nachr.-bl. D. M. Ges. 1889, p. 154, (*unfigured*). Ussab, in Damaraland, S. Africa.

STENOTREMA (Vol. III, p. 139).

H. STENOTREMA Fér. (Vol. III, p. 140.)

Var. *subglobosa* Pils. (pl. 50, figs. 26, 27). Spire lower than in typical *stenotrema*, and color horn-brown, lips much developed, the distal end of the parietal lamella being curved and produced inward, the basal lip having a corresponding sinus, and on its outer margin there is a small tooth. A short buttress from the parietal lamella connects with the outer termination of the lip.

Woodville, Alabama.

H. MONODON Rack. (Vol. III, p. 142.)

This species has several very distinct varieties. Var. *cincta* Lewis (pl. 50, figs. 28–30) is very much depressed, with broad umbilicus, brown at periphery and suture. Var. *aliciæ* Pils. is extremely globose, elevated, closely coiled, imperforate or nearly so. It inhabits the moist lowlands of south-western Louisiana, the figured specimen being from Lake Charles.

H. ELEVATA Say, (Vol. III, p. 148) *read* figs. 57–59, *instead of* 57–69.

TRIODOPSIS (Vol. III, p. 143.)

This section includes the American species which Tryon has placed under "Isognomonostoma." The Old World forms, *H. personata* and *subpersonata* belong to the restricted genus *Helix*, near *Campylæa*, etc. The *H. yucatanea* Morel. (p. 146) belongs to the *H. texasiana* group of section *Dædalochila*.

H. APPRESSA Say (p. 148). Pl. 50, figs. 6, 7 (young.)

This species attains a very large size in some parts of the South. Specimens from Woodville, Alabama, measure: alt. 10, diam. 21 mill.

H. OBSTRICTA var. CAROLINENSIS Lea. Pl. 50, figs. 8, 9, 10.

Shell distinctly angulated at the periphery, strongly costulate above, smoother below; the dull upper surface sometimes showing a few sparsely scattered microscopic granules, under a lens. Aperture having three strong teeth. Differs from typical *obstricta* in the far less compressed peripheral keel; from *palliata* in the very different sculpture, etc.

South Carolina.

H. SARGENTIANA Johnson & Pilsbry. Pl. 50, figs. 1–5.

Shell depressed, imperforate, lens-shaped, carinated. Surface strongly rib-striate, the striation disappearing toward the center of the base; under a lens the surface between the rib-like striæ is seen to be finely granulated. The aperture is wide, oblique; lip broadly reflexed, flattened, the basal lip bearing a long lamella, as in *H. appressa*. Upon the parietal wall there is a strong, high, curved tooth, like that of *H. elevata* but longer. There are 6 whorls. The color is light russet above, paler or whitish below.

Alt. 11, diam. 24 mm.
Alt. 12, diam. 24 mm.
Alt. 9 diam. 22 mm.

Woodville, Alabama.

Helix sargenti J. & P., Nautilus vi, p. 8 (May, 1892). Not *H. sargenti* BLD.—*H. sargentiana* J. & P. t. c., p. 48.

This species differs from *H. appressa* in its larger size, stronger striation, and more especially in the *granulated* instead of *spirally striate* microscopic sculpture, the strong carination, etc. It is allied in shape and sculpture to *H. carolinensis* Lea, but differs in totally lacking the upper lip tooth, in being flatter, more concave below, etc. The young shells (pl. 50, figs 4, 5) differ markedly from

young *H. appressa* (pl. 50, figs. 6, 7), being flatter above, acutely carinated, and more broadly umbilicated.

H. ROPERI Pilsbry. Pl. 50, figs. 19, 20.

Shell broadly umbilicated, flattened, subdiscoidal, resembling in general form (but not in texture or sculpture), *H. harfordiana* Cooper and *H. polygyrella* Binn. & Bld.; rather thin, *opaque, lusterless, reddish chestnut-colored;* surface delicately obliquely striated above, smoother beneath, *all over beset with short, delicate hairs.* Spire scarcely perceptibly convex, flat; sutures moderately impressed; apex light-colored; whorls 5½, convex, very slowly widening, the last wider, rounded on the periphery and below; slightly, rather abruptly deflexed at the aperture, constricted immediately behind the peristome. Aperture oblique, lunate-trilobate; peristome well expanded, thickened within, brownish, outer margin bearing a square tubercular tooth within, basal margin bearing a small tubercle near its union with the outer margin; parietal wall with a long slightly curved transverse lamella, its upper termination opposite the superior lip-tooth. Umbilicus broad and deep.

Alt. 3, diam. maj. 8, min. 7 mill.

Redding, at the head of the Sacramento Valley, Shasta Co., California.

H. (*Triodopsis*) *roperi* PILS., Nautilus iii, p. 14, figs.—*Polygyra roperi* W. G. BINN., Third Suppl. Terr. Moll. V, p. 212. (*Woodcut.*)

Three specimens of this species were found in river drift by Mr. E. W. ROPER of Revere, Mass. The shell seems to be intermediate in contour between *H.* (*Triodopsis*) *loricata* Gld. and *H.* (*Polygyrella*) *harfordiana* J. G. Cooper. It differs from the former in being flatter, much more broadly umbilicated, with different spire and notably different surface sculpture; from the latter it differs in the totally different texture and hairy surface.

H. EDENTATA Sampson. Pl. 50, figs. 16, 17, 18.

Shell imperforate, much depressed globose, light brownish-horn colored, somewhat translucent, but having an opaque buff streak behind the peristome. Surface but little shining, showing under a lens numerous short, low, cuticular lamellæ, elongated in the direction of growth-lines (fig 18a.).

Spire low, convex; suture moderately impressed. Whorls 5, the apical whitish, the last whorl abruptly, shortly deflexed in front,

very strongly and suddenly constricted behind the lip, which is reflexed, thickened and white; the outer and outer-basal segment of the lip is strongly thickened, and at the middle of the outer lip there is a hardly noticeable tubercle, with another a little outside of the middle of the basal lip, the space between them more thickened inwardly; parietal wall bearing an oblique, curved blade-like tooth.

Alt. 6·8, diam. 11·7 mill.

Boston Mts., Crawford Co., Arkansas.

Triodopsis edentata Samp., Nautilus iii, p. 85, figs. (Dec., 1889.)

The form and sculpture are quite as in *H. inflecta*, but the obsolescence of the lip-teeth render it strikingly different from that species.

Metodontia (Vol. III, p. 149.)

This section must be removed to the neighborhood of section *Petasia*. It has nothing to do with *Triodopsis*.

Mesodon (Vol. III, p. 150.)

H. armigera Ancey. Pl. 50, figs. 21, 22, 23.

Shell perforated, globose, rather thin but solid, light chestnut-brown; entire surface (except inner 2½ whorls) clothed with delicate short equidistant hairs, arranged in very oblique rows.

Spire low-conoid, apex obtuse. Whorls 5¾, convex, slowly widening, last whorl rounded, very convex below, very little deflexed in front, decidedly contracted behind the lip, which is regularly and rather widely expanded, dilated at the columellar insertion, its face brown. Parietal wall often having a small lamellar white tooth. Aperture rotund-lunate, somewhat oblique.

Alt. 8, diam. 12 mill.

San Francisco, California, to Vernon, B. C.

This is smaller than the typical *H. columbiana*, more globose and convex beneath, more densely hirsute, and with less expanded peristome.

H. kiowaensis Simpson. Pl. 50, figs. 13, 14, 15.

Shell depressed, umbilicated (the umbilicus deep, and one-tenth the diameter of the shell), solid, opaque, straw-colored, minutely speckled with buff. Surface somewhat shining, regularly striated obliquely, and showing under a lens traces of microscopic spiral lines. Suture moderately impressed. Spire convex. Whorls 5–5⅓, slowly widening, the last slightly falling at the aperture, quite con-

vex below, somewhat constricted behind the basal and outer lips. Aperture round-lunate, small, very oblique; peristome slightly expanded, heavily thickened within, white or purplish, the ends somewhat approaching.

Alt. 8½, greater diam. 14 mill.

Kiowa Station, Limestone Gap and near Eufaula, Indian Territory.

H. kiowaensis SIMP., Proc. U. S. Nat. Mus. 1888, p. 449.—*Mesodon kiowaensis* W. G. B., Third Suppl. T. M. v, p. 199, figs.—Var. *arkansaensis* PILS., The Nautilus iv, p. 131, 1891.

This very well-defined species may be a toothless *Triodopsis*, as Binney suggests. It seems to be very distinct from all other species, but certain forms of *H. thyroides* have a faint resemblance.

Var. *arkansaensis* Pilsbry. Pl. 50, figs. 11, 12.

Shell more robust, with larger aperture and smaller umbilicus one-fifteenth the diameter of the shell.

Alt. 9½, diam. 15–15½ mill.

Near Hot Springs, Arkansas (F. A. Sampson.)

PLECTOPYLIS (Vol. III, p. 159.)

It should be noted that the name *Atopa* Alb. cannot be used for the Ceylonese group allied to *Plectopylis*, on account of the previous use of that generic term in Coleoptera. The name CORILLA Ads. must replace it.

P. JOVIA Mabille. Vol. IX, pl. 20, figs. 1, 2, 3, 4.

Shell depressed, discoidal, very broadly umbilicated, the umbilicus regular, funnel-shaped, its width contained not quite 2½ times in the diameter of the shell; solid, opaque, obliquely striatulate and decussated by subobsolete microscopic spiral lines above; reddish under a (deciduous?) yellowish-brown cuticle; lusterless.

Spire slightly convex, composed of 7½ very slowly increasing whorls; the last whorl wider, *rather strongly deflexed in front*, very convex beneath and obtusely subangulated around the umbilicus. Aperture oblique, rotund-truncate, the peristome well curved, strongly reflexed, its face white and thickened, ends joined by an *elevated lobe of the parietal callus*, from which an entering lamella arises extending a short distance inward. At the last third within the whorl it is obstructed by a broad, curved, transverse, parietal

plate, the convexity of the curve outward, *the upper border of it slightly scalloped*; a minute denticle stands in front of the lower end of this plate. The outer wall bears 7 plicæ, the two outer small, parallel to the sutures, the next to the lowest fold very minute, situated somewhat back of the others; the four median larger, and directed obliquely across the whorl.

Alt. 13, diam. 29–31 mill.

Near Halong, Tonquin.

Plectopylis jovia MAB., Bull. Soc. Mal. Fr. 1887, p. 99.

This species, of which part of the original lot collected by the Abbé Vathelet, is before me, is allied to *P. schlumbergeri*, differing mainly in the more elevated parietal callus and larger size.

It is not improbable that both *jovia* and *villedaryi* will prove to be varietal forms of *schlumbergi*.

P. VILLEDARYI Ancey. Pl. 43, figs. 36, 37, 38, 39. this is f

Shell depressed, the spire nearly plane; umbilicus regular, broad, its width contained about 2½ times in the greatest diameter of the shell; solid, opaque, striated.

Whorls 6½, very slowly widening, the last descending in front, very convex, almost angular around the umbilicus. Aperture oblique, obstructed by an *elevated tongue-shaped callus* connecting the ends of the peristome, which is very heavily thickened and strongly reflexed. A stout lamella arises from the middle of the parietal callus and extends obliquely into the mouth, being about 4–5 mill. long. One-third of a whorl inward the throat is obstructed by a transverse septum on the parietal wall, in *front of each end of which there is a small tubercle*, the upper one smaller, the lower elongated; on the outer wall there are 7 short plicæ, the two outer ones minute, parallel with the sutures, the lowermost separated from the next visible fold by a rather wide space, in which when closely examined a more minute fold is seen, situated to the rear of the others; the rest of the folds are larger, obliquely placed.

Alt. 9, diam. 20 mill.

Region of Lang-son, and Bac-ninh, Tonquin.

Plectopylis villedaryi ANC., Le Naturaliste, March, 1888, p. 71, fig. 2.

Differs from the *schlumbergeri* chiefly in the smaller size and more elevated parietal callus. It is also closely allied to *jovia*, but a close examination shows certain differences, such as the presence of

two small denticles in front of the parietal partition, and the even, instead of scalloped, edge of the latter. The specimens before me were collected by the Abbé A. Vathelet.

P. PHLYARIA Mabille. Pl. 43, figs. 40, 41, 42.

Shell openly umbilicated, depressed-discoidal, thin, a little solid, scarcely shining, dull whitish under a deciduous, grayish, hairy cuticle, arcuately striated and seen under a lens to be covered with imbricating lamellæ. Spire flat, apex shining, smooth, corneous. Whorls 7½, narrow, convex, rather rapidly and regularly increasing, separated by a deeply impressed suture. The last whorl large, but little wider than the preceding whorl if viewed from above; laterally compressed, obscurely angulated at the periphery, deeply descending in front, tortuous, a little convex beneath. Aperture half-round, toothed, the margins connected by a transverse parietal lamina behind which a dentiform callus emerges; peristome white, thick, reflexed. Alt. 5½, greater diam. 15, lesser 13 mill.

Tonquin.

Helix phlyaria MAB., Moll. Tonk. diagn., p. 6, May, 14, 1887; Bull. Soc. Mal. Fr. 1887, p. 100, t. 2, f. 1, 2, 3.

Unfigured species of Plectopylis.

PLECTOPYLIS AZONA Gredler, Nachr.-bl. D. M. Ges. 1889, p. 155, 156. China.

HELIX ESAU Gredler, Jahrb. D. M. Ges. xiv, 1887, p, 346. Province Hupé, China. HELIX JACOB Gredler, *l. c.*, p. 347. Hupé. HELIX PATUNGANA Gredler, *l. c.* p. 348. Shi-shia-ho, southwest Hupé. The systematic position of these small, toothless species is uncertain. They group with *kuangtungensis*, *squamulina*, etc.; and may belong in the neighborhood of *Plectotropis*.

HELIX VALLATA Heude, Journ. de Conch. 1889, p. 45. Tchen-K'eou, China. See also Gredler, Nachr.-bl. D. M. Ges. 1889, p. 202.

Genus HELIX L.

Subgenus XEROPHILA Held.

Section *Candidula* Kobelt.

H. HERIPENSIS Mabille. Pl. 44, figs. 92, 93, 94.

Shell depressed, openly umbilicated, the umbilicus narowing very rapidly, its width contained about 5½ times in the diameter of the

shell: solid, opaque, whitish, *begirt by numerous unequal bands and lines, which may be either interrupted, faint brown or corneous-brown, or dark brown and nearly continuous; a supra-peripheral stronger band generally developed, the periphery itself marked by a white line.* Surface *finely, closely and very distinctly striated*, equally above and below.

Spire somewhat convex; apex obtuse, the earlier 1½ whorls corneous. Whorls 5½, slightly convex, slowly increasing, the last much wider, rounded at the periphery, usually very obsoletely angled at its origin, shortly descending in front. Aperture oblique, transversely oval, slightly lunate; peristome thin, thickened within by a strong white rib.

Alt. 6½, diam. 11 mill.

Alt. 5, diam. 8 mill.

Near Paris, Lagny, etc., France.

H. heripensis Mab., Bull. Soc. Zool. Fr. 1877, p. 304.—West., Fauna, p. 265.—*H. solaciaca* Mab., *l. c.*

The regular, fine striation and very rapidly narrowing umbilicus, showing less than one whorl, are characteristic. Compared with *H. trepidula* this species is much more regularly, strongly striated and less angular at the periphery.

A large number of specimens is before me, sent by A. Locard, exhibiting considerable variation in color and size.

Var. *solaciaca* Mabille. Pl. 44, figs. 83, 84.

Agrees with *heripensis* in the delicate, regular rib-striation, the very rapidly narrowing umbilicus, etc. Color-pattern as in *heripensis*, but bands rather pale and upper surface sometimes radially streaked. Differs from *heripensis* only in the somewhat more robust, swollen body-whorl. Alt. 7½, diam. 12 mill.

This is the merest local form of *heripensis*, not really worth a name. The specimens before me are from Locard.

H. loroglossicola Mabille. Pl. 44, figs. 88, 89.

Shell depressed, umbilicated, the *umbilicus rapidly narrowing to a mere perforation*, and showing hardly more than a half-whorl; its width contained 6 times in the diameter of the shell; solid, opaque, chalk-white or of a light brown tint with a white peripheral line, sometimes unicolored but usually showing traces of few or many light brown bands, of which one above and another below the periph-

ery are broader and somewhat more constant. *Surface very regularly and finely rib-striated,* as in *H. heripensis.*

Spire very low, but slightly convex. Whorls 5½, slightly convex, slowly increasing until the last which is much wider and descends a trifle in front; it is *strongly carinated in front, the carina situated high on the whorl,* and extending from its origin about one-half around, where it gradually becomes obsolete; the latter part of the body-whorl being rounded at the periphery and regularly convex beneath. Aperture round-lunate, basal and outer lips regularly curved, peristome strengthened within by a strong white rib.

Alt. 5½, diam. 10⅓ mill.

Lyons, France.

H. loroglossicola Mab., Bull. Soc. Zool. Fr. 1877, p. 304.

This species, which I have received from Arnould Locard, belongs to the immediate group of *H. heripensis,* agreeing in sculpture, umbilicus and aperture with that species, but differing in the generally more pallid coloring and the strong carination of the first half of the body-whorl.

H. andalusica Kobelt. Pl. 40, figs. 43, 44.

Shell depressed, openly umbilicated, the umbilicus about one-fifth the diameter of the shell; solid, opaque, *white or a little tinged with brown, showing some scattered translucent dots,* and sometimes a narrow brown interrupted band above the periphery, margined below by a white one. Surface very finely and regularly striated above and below.

Spire low-conic, the apex minute; apical whorl dark. Whorls 5¾, rather convex, *very slowly increasing,* the last much wider, rounded at periphery and beneath, a trifle descending in front.

Aperture oblique, oval-lunate, peristome having a *very strong white rib within,* the outer margin well curved, basal margin a little straightened.

Alt. 7–7½, diam. 11½–12 mill.

Algesiras, etc., southern Spain.

H. andalusica Kob., Jahrb. D. M. Ges. ix, 1882, p. 70; Rossm. Icon., n. f. iv, p. 22, f. 540.

Belongs to the group of *H. caperata*; well characterized by the peculiar umbilicus. The specimens described above are from Ponsonby.

H. ORDUNENSIS Kobelt. Pl. 40, figs. 77, 78.

Shell small, narrowly but deeply umbilicated, globose, slightly depressed, strongly striated, white or yellowish-white with two sharply defined chestnut-brown bands on either side of the middle line, the upper band ascending the spire; prettily marked with a narrow pale line on the base. The spire is convex with small, smooth, blackish, apex. There are five rather convex whorls separated by a simple linear suture: they increase regularly and are closely and regularly striated; the last is somewhat angulate, regularly rounded, hardly noticeably descending in front; the aperture is but little oblique, nearly circular, peristome simple, sharp, having a distinct white rib within: the margins converging; columellar margin scarcely dilated at the insertion. (*Kob.*)

Alt. 5½, greater diam. 7½, lesser 7 mill.

Near Orduna, on the rocky crown of the Concha d' Orduna.

H. (Candidula) ordunensis KOB., Nachrichtsbl. D. M. Ges. 1883, p. 115; Rossm. Icon. n. f. iv, p. 23, f. 542.

Differs from other species in the small size.

H. VATONNIANA Bgt. (H. FLORENTIÆ Ponsonby). Pl. 40, figs. 47, 48.

Shell small, narrowly perforated, globose-trochoidal, rather strong, not shining, dirty white with a few indistinct clear-brown bands of spots and a series of more intensely colored, larger, radially disposed spots under the suture. Spire high conical, with minute, hardly obtuse apex. There are more than five well rounded whorls; the upper ones are smooth, horn colored; the following irregularly and in places rather coarsely striated; they increase slowly and are separated by a linear suture; the last is nearly cylindrical, only a trifle flattened on the base, not descending in front. Aperture nearly circular, very little lunate, and but slightly oblique; the peristome is thin, simple, not noticeably lipped; the margins scarcely approach each other, and the basal margin is hardly dilated at the insertion. (*Kob.*)

Alt. 6½, greater diam. 7, lesser 6½ mill.

Dunes east of Tangier.

H. florentiæ PONS. *mss.* KOBELT, Jahrb. D. M. Ges. 1882, p. 68; Rossm. Icon. n. f. iv, p. 23, f. 543.

Seems to stand in the group of *H. apicina*, but differ widely from other species in the high spire. Mr. Ponsonby now regards the species as a synonym of *H. vatonniana* Bgt.

H. PSILORITANA v. Maltzan. Pl. 40, figs. 68, 69.

Shell small, rather widely perforated or narrowly umbilicated, depressed globose, strong; roughly striated, the last whorl rib-striated. White, generally marked with three brown bands, of which the upper one indicates the periphery and is broader than the two lower, but sometimes it occurs also with 4 or 5 bands. The spire is quite convex, with minute, pointed, brownish apex. There are between 5 and 6 whorls, which are quite convex and widen extremely slowly and regularly. The suture is linear, scarcely impressed, but distinctly and under the lens quite finely crenulated. The last whorl is rounded, hardly wider and very indistinctly descending in front. The aperture is not very oblique, quite circular, but somewhat dilated transversely and moderately lunate; the peristome is acute and strongly white-lipped, the margins converge but are not connected by a callus; the upper margin is somewhat produced forward. The basal margin slightly reflected and scarcely dilated at the insertion. (*Kob.*)

Alt. 6, greater diam. 8, lesser 7¼ mill.

Near Asomato, on the Psiloriti, the ancient Cretan Ida, on trunks of olive trees.

H. (*Candidula?*) *psiloritana* v. MALTZAN, Nachrichtsbl. D. M. Ges. 1883, p. 105.—KOBELT, Rossm. Icon. n. f. iv, p. 26, f. 550.

H. DIENSIS v. Maltzan. Pl. 40, figs. 75, 76.

Shell narrowly perforated, depressed-conoidal, rather strongly and regularly striated; solid, whitish with scarcely distinct brown bands. Spire rather high with quite minute, dark apex. Six well rounded whorls increasing very slowly but separated by a linear suture; the last whorl is scarcely widened, more or less distinctly obtusely angulate at the periphery, and rounded below; in front very shortly, distinctly deflected. The aperture is oblique, round-ovate, distinctly lunate; peristome acute, having a not especially strong white lip within; the margin approaching slightly; the upper is produced throughout, the basal margin but very little reflected, and very little dilated over the perforation. (*Kob.*)

Alt. 7½, greater diam. 11½, lesser 10 mill.

Standia (anciently *Dia*) *on the north coast of Crete.*

H. (*Candidula?*) *diensis* MALTZ., Nachr. D. M. Ges. 1883, p. 104. —KOB., Rossm. Icon. n. f. iv, p. 26, f. 549.

H. SUBVARIEGATA v. Maltzan. Pl. 40, figs. 70, 71.

Shell small, narrowly but deeply umbilicated, depressed, solid, distinctly but irregularly striated, rather shining; white, very prettily marked with intense interrupted chestnut-brown bands, of which the upper lies at the periphery and follows the suture up the spire. The spire is depressed-convex, with minute, obtuse, horny-brown apex. The five whorls are well rounded from the beginning, and increase slowly and regularly; they are separated by a simple linear little-impressed suture; the last whorl is scarcely widened, hardly noticeably descending in front, the base somewhat flattened and passing perpendicularly into the almost cylindrical umbilicus. The aperture is oblique, rounded-ovate, strongly lunate, the bands showing in the throat; the peristome is simple, acute, having a low but broad white lip within; the margins converge but little and have no connecting callus. The columella margin is hardly dilated at the insertion. (*Kob.*)

Alt. 5½, greater diam. 8½, lesser 8 mill.

Tuzla, Bay of Suda, Crete.

H. (*Candidula*) *subvariegata* v. MALTZAN, Nachr. D. M. Ges. 1883, p. 105.—KOBELT, Rossm. Icon. n. f. iv, p. 27, f. 551.

H. HELLENICA Blanc & Westerlund. Pl. 34, figs. 60, 61.

Shell narrowly but deeply umbilicate, rudely ribbed-striate, the base smoother; depressed-turbinate or convex-depressed, rather solid, opaque; whitish, variously adorned with brown lines and bands, streaked and variegated above. The spire convex or depressed-conical, with small, smooth, horn colored, slightly obtuse apex. The six whorls are convex from the beginning and increase rather fast but regularly; they are separated by a linear impressed suture; the last is somewhat widened, indistinctly angulate, the angle generally disappearing toward the mouth; base regularly convex; not deflected in front. The aperture is but little oblique, nearly circular, slightly lunate; peristome straight, acute; young examples have a weak whitish lip, but adults having a strong yellowish-red lip; the margin in front of the lip also yellowish-red in color; the margins converge; the columellar margin is somewhat reflected and slightly dilated at the insertion. (*Kob.*)

Alt. 6, greater diam. 9, lesser 8 mill.

Chalcis, Eubœa, Greece.

H. hellenica Bl. & West., Aperçu Faun. Mal. Grèce, p. 70.—Kobelt, Rossm. Icon. n. f. iv, p. 27, f. 552.—Not *H. hellenica* Bgt. *teste* Bgt.

Var. contempta Parreyss. Pl. 34, figs. 58, 59.

Agrees with *H. hellenica* in size, sculpture and form of the umbilicus, but the last whorl is much more compressed, and lip thinner and white. Alt. 6½, greater diam. 9, lesser 8 mill.

Greece.

H. contempta Parr. *in sched.* Kobelt, Rossm. Icon. n. f. iv, p. 28, f. 553.

H. jaylei Paladilhe (Vol. IV, p. 14). Pl. 46, figs. 45, 46, 47, 48.

Figures are here given, drawn from specimens communicated by Mr. John Ponsonby. They represent the var. *rusticula* Palad.

H. sardiniensis Villa. Pl. 45, figs. 18, 19, 20, 21.

This has been considered a synonym or variety of *H. conspurcata*, but it is smaller, has fewer whorls, which increase more rapidly and less regularly; the umbilicus is not so narrow, the aperture is larger, less rounded, more quadrate. The sculpture consists of elevated riblets, very different from that of *conspurcata*.

Sardinia.

H. sardiniensis Villa, Conch. ed insetti raccolti nell' isola di Sardegna, 1836.—Paulucci, Bull. Soc. Mal. Ital. viii. p. 257, t. 7, f. 7.

H. quisquiliæ Paulucci. Pl. 45, figs. 25, 26, 27.

Shell narrowly umbilicate, globose depressed, slightly carinated, thin, subopaque; horn-colored, variegated with a few white flames; having irregular distant hairs, and distinctly sharply costulate; spire elevated, apex corneous, smooth, obtuse; whorls 4½–5, slightly convex above, regularly increasing, separated by a profound suture; last whorl a little larger, strongly descending in front; subcarinated in the middle, convex below; aperture small, oblique, little lunate, ovate-rounded; peristome straight, simple, acute; columellar margin slightly reflected. (*Paul.*)

Alt. 4, diam. maj. 5½, min. 5 mill.

S. Gregorio and Villaputzo, Sardinia.

H. quisquilia Paul., Bull. Soc. Mal. Ital. 1882, p. 258, t. 7, f. 8.

Allied to *H. conspurcata*, but carinated, with smaller umbilicus, etc.

Section *Helicella* Moq.-Tand.

H. CESPITUM Drap. (Vol. III, p. 241). Pl. 39, figs. 36–42.

The illustrations here given represent Algerian forms, collected by Kobelt. Figs. 40, 41, from near Constantine; fig. 37 represents a specimen from Akbou, in the valley of the Sahel, which is said by Kobelt to be the most beautiful specimen of *cespitum* brought by him from Africa, and by him is called var. *sabatieri*. Figs. 38, 39 are from one of the large white specimens, common in the Province Constantine.

H. CALOPSIS Bourguignat. (Vol. III, p. 227). Pl. 38, figs. 1–4.

Figures from Kobelt are here given showing the mature shell of this species, which was not known to Bourguignat.

Environs of Cherchell, north coast of Algieria.

H. SITIFENSIS Bourguignat. Pl. 39, figs. 32, 33.

Shell broadly but in part covered umbilicate, depressed, globose, rather solid, chalky, little shining; white, sometimes with traces of brown streaks; irregularly striated, the last whorl malleated and marked with irregular impressions; whorls from 6 to 6½, regularly increasing, separated by an impressed linear suture, convex; the last whorl cylindrical, generally descending slowly in front. Aperture subcircular, lunate, slightly tinted with buff inside; peristome thin, acute, margined within with buff-brown, then having a thin, narrow, white lip; margins converging, scarcely connected, columellar margin dilated at the insertion and reflected partly over the umbilicus. (*Kob.*)

Alt. 18–19, greater diam. 25, lesser 22 mill.

Near Setif, Province of Constantine, Algiers.

H. setifensis Bgt. in LETOURNEUX, Exc. en Kalybie.—KOBELT, Rossm. Icon. n. f. iv, p. 88, f. 685, 686.

This is always distinguished from *cespitum* by the yellow-brown edge within the lip.

H. MONERIANA (Bourg.) Kobelt. Pl. 39, figs. 25–29.

Shell profoundly umbilicate, the umbilicus varying much in size, but partly covered by the reflected peristome; the form very variable, varying from depressed-globose to conic-globose; strong, chalky, but somewhat shining; unicolored white with a few scattered blue-black dots, the upper whorls closely regularly ribbed-striate, the lower irre-

gularly roughly striated, sculptured with malleated impressions and short horizontal oblique lines. There are fully 7 whorls, slowly and rather regularly increasing, the upper forming a small and somewhat projecting, translucent and horn-colored or blue-black apex; the following are quite convex, separated by the linear suture which becomes deeply impressed below; last whorl cylindrical and a trifle flattened below, generally not at all descending in front, but specimens also occur in which the last half of the whorl descends. Aperture rather large, circular or ovate-circular, strongly lunate, slightly tinted with yellowish inside; the peristome is thin, acute, simple, at a little distance within it is strongly white lipped; the margins converge somewhat and are connected by a thin scarcely noticeable callus; columellar margin somewhat dilated at the insertion and reflected over the umbilicus. (*Kob.*)

Alt. 21, greater diam. 27, lesser 22½ mill.

Alt. 20, greater diam. 25, lesser 22½ mill.

Alt. 18½, greater diam. 26, lesser 22 mill.

Near Berrouaghia, Algieria.

H. moneriana Bourg., KOBELT, Rossm. Icon. n. f. iv, p. 88, f. 682–684.

Has a stronger white lip than *cespitum*, and the umbilicus is narrower.

H. LAURINÆ Issel. Pl. 44, figs. 99, 100, 1.

Shell profoundly perforated, globose-depressed, transversely dilated, fragile, shining, striatulate and irregularly slightly malleated, brown, ornamented with white or brown-dotted radiating bands. Apex smooth, very obtuse, brownish. Whorls 6½, separated by an impressed suture, the upper ones nearly plane, the last rotund, inflated, dilated at the aperture and slightly descending. Aperture oblique, subrotund; peristome acute, margins separated.

Alt. 10, diam. 16 mill. (*Issel.*)

Tunis (Marchese Laura Doria.)

Helix (Xerophila?) laurinæ ISSEL, Annali Mus. Civ. di Storia Nat. di Genova (2) ii, 1885, p. 6, figs.

Somewhat allied to *H. cantæ* Bgt. and *tiranoi* Bgt. of Spain.

H. AFFINIOR Debeaux. Pl. 39, figs. 34, 35.

Shell moderately but deeply umbilicate, depressed globose, the spire conoid, apex minute, subobtuse; opaque; solid; all over rudely

and rather irregularly ribbed-striate; white, encircled by interrupted chestnut bands, tinted with buff above and around the umbilicus; the upper surface of the spire radially streaked, having a series of white spots at the suture; whorls 6, slightly convex, slowly regularly increasing, separated by an impressed suture; the last whorl slightly dilated, inflated and rounded beneath, abruptly and deeply deflected in front. Aperture very oblique, transversely ovate, lunate; peristome acute, subdilated, very distinctly lipped with brown within; the margins converging hardly joined; basal and columellar margins slightly reflected. (*Kob.*)

Alt. 12, greater diam. 16, lesser 14 mill.

Near La Senia, on the salt lake of Oran.

H. affinior Deb., Kobelt, Rossm. Icon. n. f. iv, p. 91, f. 701.

This species is very closely allied to *H. sebkarum*, which occurs with it, but is more globose, more evenly sculptured, always handsomely banded, and the last whorl is much less widened.

H. sebkarum Debeaux. Pl. 39, figs. 30, 31.

Shell rather narrowly and deeply umbilicate, depressed-globose, spire depressed-conoid, the apex minute, violaceous; dull whitish, here and there tinged with light brown; chalky; whorls 6, slowly increasing, separated by an impressed suture; the upper whorls scarcely convex, regularly and sharply striate; the penultimate whorl more convex, smoother; the last whorl dilated, compressed, sculptured with short impressed longitudinal lines, closely and strongly ribbed behind the aperture, abruptly deflected in front. Aperture oblique, rather irregularly ovate-rounded, strongly lunate; the throat varying from chocolate to roseate; peristome acute, slightly dilated, having a strong yellowish-brown lip within; the upper margin somewhat straightened, lower and basal well arched, the insertions hardly connected. (*Kob.*)

Alt. 11, greater diam. 18, lesser 15 mill.

La Senia, on the banks of the Sebcha of Oran.

H. sebkarum Deb., Kobelt, Rossm. Icon. n. f. iv, p. 91, f. 700.

In coloration, texture and sculpture most nearly allied to *H. lutata*, but also reminding one of small forms of *H. subdentata* Fér. (*Kob.*)

H. calida Kobelt. Pl. 38, figs. 8, 9, 10.

Shell moderately and deeply umbilicate, depressed-trochiform, angulate, rather solid, but little shining; sculptured all over with

close acute riblets; white, beautifully ornamented with bands and streaks of chestnut; spire conoid, apex minute, projecting, buff. Whorls 6, slowly increasing, separated by a linear, hardly impressed suture, convex; last little dilated, angulate at the periphery, rounded at the base, and slowly passing into the umbilicus; produced in front but hardly descending. Aperture very oblique, subangulate, ovate, moderately lunate; peristome acute, thin, straight, lipped with white inside; the margins converging, hardly connected, columellar margin very slightly dilated at the insertion. (*Kob.*)

Alt. 11, greater diam. 17, lesser 15 mill.

Neighborhood of Hamman Rirha, eastern foot of the Zaccar, Algiers.

H. *calida* Kob., Rossm. Icon. n. f. iv, p. 78, f. 661.

H. zaccarensis Kobelt. Pl. 38, figs. 5–13.

Shell moderately and deeply umbilicate, depressed globose, solid, little shining, ribbed-striate above, the riblets close; smoother beneath; sculptured here and there with short impressed lines. Whitish having an interrupted median chestnut band and numerous brown lines; spire depressed-conoid or conoid, apex small, smooth, brown, little projecting; whorls 6, regularly increasing, the suture at first linear, then irregularly crenulated; upper whorl slightly convex, hardly carinated, the last inflated, subcylindrical, the base convex, abruptly passing into the umbilicus, scarcely descending in front, slightly dilated. Aperture oblique, lunate-circular; peristome thin, acute, straight, narrowly and rather remotely lipped with white within; margins converging, connected by a very thin callus; columellar margin slightly dilated at the insertion. (*Kob.*)

Alt. 14, greater diam. 21·8, lesser 18·5 mill.

Alt. 12½, greater diam. 18·5, lesser 16·5 mill.

On cliffs of the western Zaccar Peak, near Miliana, Algeria.

H. zaccarensis Kob., Rossm. Icon. n. f. iv, p. 77, f. 660.

Nearly allied to *H. calopsis*, but somewhat more narrowly umbilicated, having no trace of a keel, and more weakly sculptured.

H. fabriesi Debeaux. Pl. 38, figs. 19, 20.

Shell openly and deeply umbilicate, depressed trochiform, with the spire conoid; apex minute, slightly obtuse, black; rather solid, chalky, little shining; all over densely and irregularly ribbed-striate; last whorl with the exception of the tract immediately

behind the aperture, smoother, but malleated, sculptured with short impressed and horizontal lines. The color is dirty-white, without bands; whorls 6, convex; suture impressed; the upper whorls increasing slowly; the last is dilated, inflated, especially behind the aperture; at its origin bluntly angulate, becoming round; very shortly deflected in front. Aperture oblique, circular, strongly lunate, more or less tinted with rose or brown within, peristome acute, thin, slightly dilated on base and columella, or very slightly reflected, having a strong reddish lip a short distance within. The margins approach and are connected by a thin white callus. (*Kob.*)

Alt. 8½, greater diam. 15, lesser 13 mill.

Near Oran.

H. fabriesi Deb., KOBELT, Rossm. Icon. n. f. iv, p. 92, f. 703.

H. BREVETI Debeaux. Pl. 38, figs. 31, 32.

Shell with open funnel-shaped umbilicus, depressed-trochiform; the spire pyramidal, apex minute, slightly projecting; rather solid; somewhat chalky, scarcely shining, finely and densely striatulate; dull white, sometimes encircled by an almost obsolete translucent band; whorls 5, slightly convex, slowly increasing, separated by an impressed suture, the last whorl large, rounded or obsoletely subangulate at the periphery, slightly descending in front; aperture oblique, subcircular, but little lunate, white within; peristome simple, acute, slightly expanded, having a thick white lip within; margins converging, joined by a very thin callus; columellar margin slightly dilated at the insertion. (*Kob.*)

Alt. 9, greater diam. 13, lesser 12 mill.

Tlemsen, Province of Oran, Algiers.

H. breveti Debeaux, KOBELT, Rossm. Icon. n. f. iv, p. 92, f. 702.

H. HEYNEMANNI Kobelt. Pl. 40, figs. 63, 64.

Shell with wide but not perspective umbilicus; the umbilicus strongly contracted beyond the penultimate whorl; depressed, solid, striated, but little shining, chalk white, generally marked with a few sharp dark brown bands; the spire is quite depressedly convex, apex small, smooth, black; the six whorls are rather convex and separated by a linear suture, they are closely regularly rib-striated and increase regularly; the last whorl is scarcely wider, nearly cylindrical, and descends very slightly in front. Aperture round-ovate, but little lunate, with thin sharp peristome, distinctly ribbed

within ; margins converging but not joined by a callus; the columellar margin is hardly dilated at the insertion. (*Kob.*)

Alt. 7, greater diam. 12, lesser 10 mill.

Tetuan, Algiers, on fronds of the dwarf Palm.

H. heynemanni Kob., Nachr.-bl. D. M. Ges. xv, 1883, p. 114; Rossm. Icon. n. f. iv, p. 22, f. 541.

Allied to *H. andalusica*, but sufficiently different in the chalky texture, rib-sculpture, etc.

H. gouini Debeaux. Pl. 38, figs. 14, 15, 16.

Shell depressed, the spire a little convex, the umbilicus rather broad, rapidly narrowing as it penetrates, one-fifth to one-sixth the diameter of the shell. Solid, opaque; ground color white, the upper surface light brown; having numerous interrupted bands and lines of chestnut, of which one above the periphery is most constant; often having a series of alternately dark and light spots below the suture. *Surface sculptured with close, strong, curved white rib-striæ.*

Apex minute, the first whorl small, shining, dark chestnut colored; following whorls slightly convex, the last rounded at the periphery and below, slightly descending in front. Aperture nearly circular, but the penultimate whorl cuts a segment of 90° from the circle; peristome having a rather strong flesh-colored rib within.

Alt. 10½, diam. 16½ mill.

Alt. 9½, diam. 16 mill.

Salt pits of Fleurus and St. Louis, near Oran, Algiers.

H. gouini (Deb.) Kobelt, Rossm. Icon. n. f. iv, p. 90, t. 116, f. 699.

Very closely allied, says Kobelt, to *H. colomiesiana* Bgt.; but it is much more widely umbilicated than that species, if I may judge *colomiesiana* by the figures. The surface is unusually well adorned with white riblets, and some specimens exhibit alternate dark and light dashes under the suture. My description is from specimens from the collection of John Ritchie, Jr.

H. bollenensis Locard. Pl. 38, figs. 23, 24.

Shell globose-depressed with conoidal spire, umbilicated, the umbilicus narrow, about one eighth the diameter of the shell; solid, opaque, *white*, more or less suffused with rufous, or having numerous indistinct, very light tinted brown bands. Surface hardly shining,

strongly and irregularly striated above and below, the striæ somewhat flexuous.

Spire subconoidal, apex obtuse; apical 1½ whorls dark corneous; *following one or two whorls are speckled with translucent brownish;* whorls 6, slowly increasing, the last much wider, very gradually descending in front, well rounded at the periphery and beneath. Aperture oblique, rotund-lunate, *pure white within*, and having a *thin white* thickening a short distance in. Columellar margin dilated.

Alt. 11, diam. 13½ mill.

Alt. 10, greater diam. 14, lesser 12 mill.

Near Bollène, Dept. Vaucluse, France.

H. bollenensis Loc., Cat. gen. Moll. Fr. ii, p. 323.—Kobelt, Rossm. Icon. n. f. iv, p. 93, f. 704.—*H. lauracina* Fagot, Diagn. d'esp. nouv. 1884, p. 3.

Allied to *H. variabilis*, but the umbilicus is smaller, the lip-callus white, and the surface far more strongly striated. The specimens before me were sent by Locard.

H. lauracina Fagot, of which authentic specimens from the original locality are before me, offers no differential characters whatever.

H. variabilis Drap. (Vol. III, p. 230.)

Judging from specimens before me named by Arnould Locard, the following are synonyms: *H. lautaretina* Bgt., *jussiana* Bgt., *grannonensis* Bgt., *salentina* Blanc, *mendranoi* Servain.

H. submaritima Desmoulins. This name is declared by Pollonera to have precedence over that of *lauta* Lowe (Vol. III, p. 239). The species occurs at Rome and many other localities in Italy. See Bull. Soc. Mal. Ital. xiv, p. 62, pl. 2, f. 8–10.

H. terveri Mich. (Vol. III, p. 240.)

A comparison of specimens of *H. arenivaga* Mabille received from Locard, with specimens of *terveri* received from Terver, convinces me that they are specifically identical.

H. trepidula Servain. Pl. 38, figs. 17, 18.

Shell depressed, openly umbilicated, the umbilicus contained 6½–7 times in the diameter of the shell; solid, opaque, soiled white, unicolored or having obsolete brown bands. Surface having fine, slightly irregular, oblique striæ. Spire very low conic, the apex

minute, hardly obtuse, composed of 1½ dark-corneous smooth whorls. Whorls 5 or 5¼, rather slowly increasing until the last, which is much wider and rapidly increases; at its origin *the last whorl is distinctly angular above its middle*, the angle becoming less prominent on the last third of the whorl; toward the aperture, the suture descends below the peripheral angle. Aperture nearly circular except for the segment (slightly less than a fourth) cut from it by the parietal wall; the upper lip is usually somewhat straightened also. The peristome is thin, fragile, but strengthened a short distance within by a *narrow but strong brown* (or white) *rib.*

Alt. 7, diam. 12 mill.

Lyons and Marseilles, France.

H. trepidula SERVAIN, in COUTAGNE, Faune malac. du basin du Rhône, p. 12.—WESTERL., Fauna palæaret. Binnenconch. ii, p. 268. —KOBELT, Rossm. Icon. n. f. iv, p. 93, f. 705.

This species may be known by the angular body-whorl and saffron, brown lip-rib. The specimens before me, received from Locard, show rather a wide range of variation in coloring. Some are distinctly banded with translucent brown, and others show a black-brown peripheral band, with several narrower bands of the same on the latter half of the base. The columellar lip is unusually well rounded and expanded.

H. JACHNOI Clessin. Pl. 44, figs. 96, 97, 98.

Shell broadly umbilicated, strong, depressed, strongly striated, chalky-white, unicolored or with only weakly indicated bands. Whorls 5½, slowly and regularly increasing, cylindrical, separated by a deep umbilicus; the last whorl scarcely double as wide as the preceding, hardly deflexed. Aperture circular, but little modified by the penultimate whorl; peristome sharp, straight, with a white lip within, margins not approaching.

Alt. 7, diam. 16 mill. (*Cless.*)

Galicia.

H. instabilis Ziegl. in ROSSM., Icon., f. 518.—*H. jachnoi* CLESS., Moll.-Fauna Oesterreich-Ungarns u. Schweiz, p. 183, fig. 88, 1887.—var. *bakowskiana* CLESS. *l. c.*, f. 89.—*H. instabilis* var. *bakowskiana* CLESS., Mal. Bl. 1879, p. 9, t. 1, f. 6.—BAKOW. Miezcaki zebr. na Podulu 1879, p. 5, t. 1, f. 8, a, b.

This species is separated from *H. instabilis* by the very convex whorls, deeper suture, and slower, more regular increase of the

whorls. In striation it is nearer to *H. candicans* than to *H. instabilis.*

Var. BAKOWSKIANA Clessin. (Vol. III, p. 248.)

Smaller, spire more elevated, upper surface strongly striated, umbilicus narrower.

The *varietal* name precedes that of the *species* and should replace it.

H. HILLYERIANA Paulucci. Pl. 45, figs. 28, 29, 30.

Shell depressed globose, umbilicate, thin; whitish-buff ornamented with narrow interrupted pale chestnut zones; irregularly ribbed-striate; spire convex, apex smooth, slightly projecting, horny reddish; whorls 6½, regularly increasing, the last little larger, not descending; the suture impressed; last whorl obscurely carinated at the periphery, the carina disappearing toward the aperture. Aperture oblique, lunate, rounded, white-lipped within; peristome thin, acute, straight, columellar margin slightly reflected. (*Paul.*)

Alt. 9, greater diam. 12½, lesser 11 mill.

Decimomanun, Sardinia.

H. hillyeriana PAUL., Bull. Soc. Mal. Ital. 1882, p. 251, t. 7, f. 4.

H. TUTA Paulucci. Pl. 45, figs. 22, 23, 24.

Shell globose, nearly covered perforate, thin; whitish, having many chestnut bands, or buff, banded and dotted; substriate. Spire convex, apex minute, corneous or blackish, smooth; whorls 5½–6, slightly convex, the first slowly, the rest rapidly increasing, separated by an impressed suture; last whorl larger, swollen, rotund, straight at the aperture. Aperture oblique, exactly rounded, slightly lipped within; margins joined by a very thin callus, columellar margin slightly reflected, half covering the perforation. (*Paul.*)

Alt. 9⅔–11, greater diam. 13–14, lesser 11¼–12½ mill.

Sardinia.

Helix tuta PAUL., Bull. Soc. Mal. Ital. 1882, p. 245, t. 7, f. 1.

H. DOHRNI Paulucci. Pl. 45, figs. 15, 16, 17.

Shell globose, conoid, nearly covered umbilicate; thin; dull gray, ornamented with narrow interrupted chestnut zones; distinctly but unequally striated; spire conoid, apex obtuse, smooth, pale corneous; whorls 6–6½, the inner slowly and regularly increasing (the last and next to the last much larger and more globose), separated by a distinct suture, last whorl ventricose, rounded, rapidly descending;

aperture little oblique, subrotund; margins converging; peristome acute, straight; columellar margin reflected, partly covering the perforation. (*Paul.*)

Alt. 10, greater diam. 11, lesser 10⅓ mill.

Sassari, Sardinia.

H. dohrni PAUL., Bull. Soc. Mal. Ital. 1882, p. 252, t. 7, f. 3.

HELIX (HELIOMANES) RICHARDI Ponsonby mss., Kobelt, Nachr.-Bl. D. M. Ges. 1889, p. 141. Black Cape, Africa.

Near to *H. dautzi* Kob., but more solid and rudely costulate.

H. CARUANÆ Kobelt. Pl. 27, figs. 82, 83, 84.

Shell moderately and rather openly umbilicate, subglobose, or depressed-globose, thin but rather solid; little shining; irregularly ribbed-striate, the striæ close, under the lens seen to be often transversely interrupted; visible within the umbilicus. Buff-whitish or gray, having a whitish peripheral band, with an interrupted wide chestnut band above it; the rest of the upper surface is variously marked with red-brown flecks, streaks and narrow interrupted bands; whorls 6, rather rapidly and irregularly increasing, separated by a suture at first linear, becoming irregularly impressed; apical whorl small, smooth, horn-colored, hardly convex, the following whorl slightly convex, the last whorl subinflated, dilated, rounded, deeply descending in front, then deflected. Aperture oblique, ovate-rounded, broadly lunate; peristome thin, acute, narrowly but distinctly lipped within, the lip buff; margins slightly converging but scarcely joined; upper margin straight, flattened, columellar margin brownish, dilated reflected over the umbilicus. (*Kob.*)

Alt. 14–15, greater diam. 21, lesser 18½ mill.

Malta.

H. caruana KOB., Nachr. D. M. Ges. xx, 1888, p. 119; Rossm. Icon. n. f. iv, p. 84, f. 672, 673.—*H. gattoi* KOB., l. c., p. 86, f. 676.

This form has hitherto been referred to *variabilis* or *cespitum*, but is apparently distinct, being probably more nearly allied to the group of *H. mauritanica* Bgt. In the series before me, received from A. Caruana Gatto, I am quite unable to see how two species are to be distinguished, although examples may be selected agreeing perfectly with Kobelt's figures of each. With all deference to the opinion of Kobelt, whose knowledge of *Xerophila* vastly surpasses my own, I am compelled by the series I have studied to rank *H. gattoi* as a variety or form.

Var. *gattoi* Kobelt. Pl. 27, figs. 80, 81.

Larger, with wider umbilicus, more cylindrical body-whorl and less intense, more speckled color-pattern.

H. LAMPEDUSÆ Kobelt. Pl. 27, figs. 77, 78, 79.

Shell narrowly and compressedly perforate, globose-conic, rather solid, rudely and irregularly ribbed-striate and malleated, slightly smoother below, the riblets passing into the umbilicus; whitish, variously marked with brown streaks and spots, usually having a broad white middle zone with brown spots radially arranged above it and coalescing below; below the central zone there is a series of interrupted and coalescing brown bands and often, a broad intensely colored brown band. Whorls 6, rather regularly increasing, separated by a linear suture, embryonal whorl minute, smooth, the following slightly convex, the last somewhat inflated, especially below; at first slightly descending, then abruptly deflected. Aperture oblique, subcircular, deeply lunate; peristome acute, simple, having a distinct buff lip within the brown margin; throat gray-blue, showing bands within; margins somewhat converging, hardly united; columellar margin slightly dilated, reflected at the insertion. (*Kob.*) Alt. 14½, greater diam. 18, lesser 16 mill.

Island of Lampedusa.

H. lampedusæ KOB., Rossm. Icon. n. f. iv, p. 85, f. 674, 675.

This pretty local form of the *variabilis* group is distinguished from the Sicilian forms by its narrower umbilicus and rougher sculpture.

H. MESOSTENA Westerlund. Pl. 44, figs. 77, 78, 79.

Shell narrowly umbilicated, the umbilicus nearly closed, somewhat widened at the opening; depressed conoidal, very closely, regularly finely striated; chalky strong opaque, whitish banded with dark, seldom unicolored. Apex blunt. Whorls 6–6½, slightly convex or flattened, somewhat angular at the suture, slowly increasing, the last whorl somewhat larger, compressed, indistinctly angular in the middle, slowly but deeply descending in front. Aperture very oblique, lunate-rounded, sometimes somewhat oval; peristome straight, sharp, white-lipped within, the terminations converging, columellar margin hardly dilated.

Alt. 6½–7, diam. 10 mill. (*W.*)

Crete at Kania, Kalathines, Kandia, Archanes, Viano and Sitia.

H. mesostena WESTERL., in West. and Blanc, Aperçu Faune Grèce, p. 71, t. 3, f. 23 (1879); Fauna Pal. Binnenconch., p. 235.—MARTENS, Archiv f. Naturg. 1889, p. 187, t. 10, f. 10.

Distinguished by its closely crowded whorls, rather flat base, dark, irregular flecking, narrow umbilicus and generally deeply descending whorl at the aperture.

The specimens from Kalathines are proportionately high, alt. 5½, diam. 6½ mill.

H. CESPITOIDES Fischer (Vol. III, p. 56). Pl. 42, figs. 29, 30.

According to Crosse (Journ. de Conch. 1887, p. 211) this shell which has been referred to *Pat. cooperi* W. G. B. as a synonym, is a form of the Mediterranean basin. The original figures are copied on pl. 42, figs. 29, 30. The original description is as follows: Shell orbiculate-depressed, rather solid, umbilicated, longitudinally irregularly striated; whorls 6½, moderately increasing; brown-violaceous and ornamented with obscure zones; rotund-globulose; suture impressed, white; last whorl rotund. Aperture obovate, transverse; peristome simple, slightly deflexed above, sub-thickened with white inside; columella not callous.

Alt. 12, greater diam. 22, lesser 19 mill.

Differs from *H. cespitum* in the darker coloration, more globulose, less flattened whorls, etc.

(*Oriental species.*)

H. BEADLEI Pilsbry, n. sp. Pl. 46, figs. 49, 50, 51.

Shell globose conoidal or trochoidal, narrowly umbilicated, the umbilicus about one-twentieth the diameter of the shell; solid, opaque, white, variously banded with purple-brown. Surface somewhat shining, rather strongly striated, the striation subregular on the spire, irregular on the body-whorl.

Spire conoidal, apex subacute; earliest 1½ whorls minute, polished, white, forming an unsculptured nuclear shell of 1⅓–1½ mill. diameter. Whorls 6½, slowly increasing, the inner ones somewhat speckled with translucent, then becoming banded, the latter half of the last whorl very gradually descending; periphery rounded. Aperture rotund-lunar, its length and breadth equal; peristome thin, not thickened within except slightly at baso-columellar margin.

Alt. 18, diam. 20½ mill.

Alt. 18, diam. 19 mill.

Alt. 14½, diam. 17½ mill. (not adult.)

Desert of Arabia.

This species, which was collected years ago by Dr. E. R. Beadle, is more allied to *H. erkelii* Kobelt than to any other form known to me. The bands have the same purple-brown color, overlaid by a whitish film, which is seen in some banded forms of erkelii, such as that figured in Rossm. Icon. iv, pl. 152, fig. 1542. It further agrees with Kobelt's species in the papillar apex, the rather distinctly striated inner whorls, and the somewhat flattened aspect of the base; but in *H. beadlei* the striation is stronger and does not disappear on the body-whorl, the spire is higher, and the umbilicus is notably narrower. Many specimens of *H. erkelii* were collected by Dr. Beadle. In the main they agree with Kobelt's figures and description better than with any other form, but they offer differences which are probably at least varietal.

H. ERKELII Kob. *var.* DISCREPANS Pils. Pl. 46, figs. 58, 59.

Shell depressed, more narrowly umbilicated than the type, very solid, unicolored white, or having a broad purple-brown band above, and a variable number of narrow ones below. Apical whorl smooth, papillar; *the following whorls of the spire distinctly striated*, body-whorl smooth. Aperture rounded-lunate, the width and alt. about equal; interior white or cream-white, without internal lip or callus; peristome simple, blunt. Alt. 14, diam. 22½ mill.

Desert of Sinai (Beadle!)

H. CANINA Ancey. Pl. 44, fig. 73.

Shell conoid-depressed, openly umbilicated, the umbilicus dilated below, moderate, not equaling a fourth the diameter of the shell; rather solid, slightly shining, obsoletely and rather irregularly striated, straw-buff, surrounded with numerous varying, narrow, very frequently interrupted brown lines. Spire depressed-conoid, apex rather minute, obtuse, corneous, smooth. Whorls 5⅞ to 6, regularly and quite slowly increasing, convex, the suture impressed; last whorl at its beginning a trifle angulated, becoming well rounded, convex below, more or less deflexed in front. Aperture oblique, scarcely labiate, narrowly lunate, transversely suboblong; outer margin slopingly descending above, basal margin rounded, columellar margin thicker, (not marginated), slightly more expanded.

Alt. 7, greater diam. 9½, lesser 8 mill. (*Ancey.*)

Liban, in the region of Nahr-el-Kelb.

Helix canina ANCEY, Le Naturaliste, 1888, p. 188, fig.

This pretty species belongs to the series of *H. joppensis* Mouss., *Krynickii* Andrz., *subkrynickiana* Mouss. It is the smallest of the group yet published. (*Anc.*)

H. MILLEPUNCTATA Boettger. Pl. 44, figs. 70, 71, 72.

Differs from *H. bargesiana* Bgt. 1854, (=*joppensis* A. Schm. 1855) in the non-excentric, more funnel-shaped umbilicus, whorls 5, not 6, more rapidly increasing from the beginning, the smoother sculpture, the striæ being closer, less acute, more irregular, and in the color.

Shell whitish or horny-white, apex brown; always having a narrow brown peripheral girdle; very elegantly ornamented with microscopic rounded tawny dots, either irregular or arranged in numerous spiral lines, absent on the umbilical region.

Alt. 9, greater diam. 14½, lesser 12½ mill.; aperture, alt. 6¼, width 6¾ mill.

Persia: Schah-rud, in the North Persian province Irak Adschmi; varieties also widely dispersed in Asia Minor and northern Syria.

Helix (*Xerophila*) *millepunctata* BTTG., Zool. Jahrb. iv, p. 948, t. 27, f. 13a-c. (1889.)

Differs from *bargesiana* Bgt., which I take to be a banded form of *joppensis* Schm., in the much more rapid increase of the inner whorls. *H. bargesiana*, *proteus* Rossm. and *Krynickii* Kryn. are remarkable for the at first extremely slow increase in width of the whorls, the last one then widening very rapidly; whilst *millepunctata* is normal in this repect, not unlike *H. derbentina* Kryn.; but from this last the entirely different marking separates it.

HELIX (XEROPHILA) SINAICA v. Martens. Sitzungs-Bericht der Ges. Naturforsch. Freunde zu Berlin, nr. 10, 1889, p. 200. Djebel Musa, 2000 meters alt., and Wadi Barak, Sinai. Distinguished from *eremophila* and *erkelii* by the raised spire and narrower umbilicus; from *joppensis* and *bargesiana* by the less rounded whorls and narrower umbilicus.

Section JACOSTA (Vol. III, p. 251.)

H. BIANGULOSA Martens. Pl. 44, figs. 85, 86, 87.

Shell umbilicated, conic-depressed, biangulate, closely radially costulate-striate, white, variegated with pale brown; spire graduate, apex obtuse. Whorls 4¾, the first pale brown, unicolored, smooth, the following obtusely angulated and banded a little under the

suture, distinctly carinated at the periphery, the carina rather thick, transversely rugulose; last whorl flattened beneath, slightly descending at the aperture. Aperture subpentagonal, little oblique; peristome straight, slightly lipped with white within.

Alt. 5½, greater diam. 7, lesser 6 mill.; aperture, alt. 3, width 3⅓ mill. (*Mts.*)

Southern Eubœa, near Stura, Greece.

H. (*Xerophila*) *biangulosa* Mts., Archiv f. Naturg. 1889, p. 176, t. 10, f. 11.

Distinguished from *H. syrensis* mainly by the second keel on the upper surface.

H. GRADILIS Martens. Pl. 44, figs. 80, 81, 82.

Shell narrowly umbilicated, pyramidal, angulate, rather solid, closely striated, white, painted with a few bands interrupted occasionally with brown or diaphanous. Whorls 5, gradate, the first smooth, white or pale brown, the rest flattened above, distinctly angulated a little above the suture; suture constricted; last whorl a little more convex below, slightly deflexed at the aperture. Aperture slightly oblique, broad-ax-shaped; peristome straight, lipped within, the outer and basal margins strongly arcuate, columella subperpendicular, slightly dilated at the insertion.

Alt. 5½–6, greater diam. 8, lesser 7 mill.

Island of Elasia, on the east coast of Crete.

H. (*Xerophila*) *gradilis* Mts., Archiv f. Naturg. 1889, p. 187, t. 10, f. 12.

Separated from H. *ledereri* Pfr. by the much blunter keel, smaller size, proportionally narrower umbilicus and weaker sculpture; from *H. pyramdata* Drap. by the regular elevation of the keel over the suture, which is the same in all the specimens. (*Mts.*)

H. CALYMNIA Martens. Pl. 44, figs. 74, 75, 76.

Shell subdepressed, moderately umbilicated, subtly radially striatulate, white, painted with interrupted narrow brown bands. Spire conical, subgradate; whorls hardly 5, convex, separated by a deep suture, the last whorl rounded, slightly descending in front. Aperture subvertical, subcircular; peristome straight, white-lipped within, margins remote from one another, columellar margin arcuate, scarcely dilated.

Alt. 4½, greater diam. 6½, lesser 4⅓ mill. (*Mts.*)

Island of Kalymnos.

H. (*Xerophila*) *calymnia* Mts., Archiv für Naturg. 1889, p. 197, t. 10, f. 9.

Described from a single specimen.

H. EMINENS Westerlund. Pl. 27, figs. 75, 76; pl. 44, figs. 2, 3, 4 (*exserta* Mts.)

Shell trochoidal, scalariform, *the peripheral keel strongly projecting above the suture;* umbilicated, the umbilicus about one-ninth the diameter of the shell. Color buff-white; surface closely ribbed-striate all over.

Spire much elevated, the apex obtuse; first whorl corneous, shining, convex; *carina beginning to project about the middle of the next whorl, becoming more and more prominent;* the last whorl convex above and below, compressed on each side of the median keel.

Aperture transversely oval, not lunate, somewhat angled outwardly; peristome thin, margins strongly converging, not much thickened within.

Alt. 6, diam. 7 mill.

Alt. 5½, diam. 6½ mill.

Island of Syra, Greece (Spratt.)

H. eminens West., Fauna Pal. Reg. Binnenconch., p. 324, (1889). —*H. syrensis* var. *exserta* Martens, Archiv für Naturgeschichte 1889, p. 183, t. 10, f. 13 (August, 1889.)

I do not know which of the names for this form has priority, both being published in 1889, and both founded upon specimens from Syra collected by Spratt. I am indebted to Mr. Ponsonby for specimens.

H. AMPHICONUS Maltzan. Pl. 40, figs. 65, 66, 67.

Shell quite narrowly perforate and depressed, distinctly carinated, low conical above and below, closely and roughly ribbed striate, the riblets running into the umbilicus below; gray-white, indistinctly banded or flecked with brown above, below having two distinct broad chestnut-brown bands, which are generally interrupted by white dots, and sometimes having a narrow brown line between them. The spire is only a little elevated, the apex small, black-brown; there are five slowly increasing whorls, surrounded by a strong thread-like projecting keel upon which the riblets project sharper but rounded; the last whorl is slightly wider, compressed upon each side of the keel, somewhat swollen around the perforation, very slightly descending in front. Aperture small, compressed,

pointedly egg-shaped, distinctly lunate, excavated at the position of the keel and channelled within; the peristome is acute having a strong white lip within; the upper margin is somewhat produced forward, lower margin slightly reflected, a little dilated at insertion. (*Kob.*). Alt. 6, greater diam. 12½, lesser 11 mill.

Sitia, Crete.

H. (*Jacosta*) *amphiconus* Maltz. Nachrichtsbl. D. M. Ges. xv, p. 103, 1883.—Kobelt, Rossm. Icon. n. f. iv, p. 25, f. 546.

A very elegant species, resembling *H. elegans* in form, but ribbed as in *Jacosta*.

H. siderensis Maltzan. Pl. 40, figs. 72, 73, 74.

Shell depressed, peculiarly obliquely perforated, the perforation transversely enlarged at the last whorl; closely finely striated, strong, but not thick. White with very distinct dark brown bands of which generally but one is upon the upper side and three to five upon the base. The spire is flatly convex with minute dark brown apex; there are five regularly increasing whorls, separated by the impressed suture which is seen to be very finely and irregularly crenulated viewed under the lens; the upper whorls are but slightly, the following somewhat more strongly convex; the last is rather broadened and more or less distinctly, bluntly, angularly flattened above toward the suture, and more so upon the under side; suddenly deflected in front. Aperture but slightly oblique, transversely ovate, having a more or less distinct angle outwardly-moderately lunate; the peristome is acute having a very distinct lip within; the converging margins are joined by a quite thin callus, the upper straight, somewhat produced forward; the columellar margin is very slightly reflected, scarcely dilated at insertion. (*Kob.*). Alt. 6, greater diam. 11½, lesser 10 mill.

Sidero Mts., Crete.

H. (*Jacosta*) *siderensis* Maltz., Nachrichtsbl. D. M. Ges. 1883, p. 104.—Kobelt, Rossm. Icon. n. f. iv, p. 26, f. 517, 518.

Very distinct in the peculiar perforation, as in *H.* (*Carthusiana*) *obstructa* Fér.

H. spratti Pfr. var. perplanata Pils. Pl. 45, figs. 12, 13, 14.

More depressed than typical *spratti*, the spire flat, upper surface of whorls having a very strong central revolving rib. Umbilicus wider and more open.

Alt. 4, diam. 11 mill. *Sicily* (Benoit.)

Cf. Westerlund, Nachrichtsbl. 1892.

H. HAMUDÆ Kobelt. Pl. 34, figs. 74, 75.

Shell openly umbilicated, depressed, suborbicular, distinctly carinated, buff-brown, variously maculated and interruptedly banded with brown or chestnut, especially above; spire convex-depressed, apex small, smooth. Whorls 5–6, the upper slightly convex, the lower carinated, carina following the suture; all whorls sculptured with close oblique riblets, noduliferous toward the sutures; last whorl a trifle dilated, very little descending in front, surrounded in the middle by a distinctly subserrate carina, convex above and below. Peristome simple, very distinctly. subremotely labiate within.

Alt. 8, greater diam. 13½, lesser 12 mill.

Porto Farina, northern Tunis.

H. hamudæ KOB., Nachrichtsbl. D. M. Ges. 1886, p. 101; Rossm. Icon. n. f. iv, p. 20, f. 536.

Quite a number of species grouping immediately around *H. amanda* Rossm., occur in Tunis, Bgt. and Letr. distinguishing seven; but none seem to be identical with this species, the name of which, besides has priority. (*Kob.*)

H. ENICA Letourneux & Bourguignat. Pl. 40, figs. 58, 59, 60.

Shell depressed, very widely umbilicated, sublenticular, distinctly bicarinate, rather solid, rudely and closely costellate above and below; gray-whitish, with inconspicuous spots and bands of rufous-brown; spire depressed-convex, apex minute, horny, smooth. Whorls 5, the last with a serrated, sublamellose, compressed peripheral carina, slightly convex between the keels. Aperture very oblique, rhomboidal, channelled outwardly; peristome acute, distinctly biangulate.

Alt. 7, greater diam. 18, lesser 16 mill.

Dschebel Zaghuan, Tunis.

H. enica L. & B., Prodr. Mal. Tunisie, p. 88.—KOBELT in Rossm. Icon. N. F. iv, p. 17, f. 532.

The difference from *H. idia* is not great, but is constant, so that the separation of the two seems expedient.

H. ZEUGITANA Letourneux & Bourguignat. Pl. 40, figs. 45, 46.

Shell profoundly and openly umbilicate, depressed, acutely carinated, entire flat above, slightly convex below; rather thin, scarcely shining, greyish-white, here and there obsoletely spotted with brown; sculptured all over with nearly regular white riblets; spire flat,

very little convex; the apex small, smooth, hardly projecting. Whorls six, very slowly increasing, encircled by a projecting and serrate carina, which the regularly impressed suture follows. The last whorl is slightly dilated, nearly flat above, with an impressed groove above the carina; swollen and subangulate around the umbilicus; slightly but distinctly descending in front. Aperture oblique, compressed ovate-acuminate in form, slightly lunate, outwardly channelled; peristome thin, acute, without visible lip within; outwardly angulate; upper lip little rounded, the basal lip more strongly rounded, hardly dilated at the insertion. (*Kob.*)

Alt. 4, greater diam. 11½, lesser 10 mill.

Dschebel Zaghuan and Dschebel Rsass, northern Tunis.

H. zeugitana L. & B., Prodr. Mal. Tunisie, p. 93.—*H.* (*Jacosta*) *zeugitana* Kob., in Rossm. Icon. n. f. iv, p. 20, f. 537.

H. ponsonbyi Kobelt. Pl. 40, figs. 61, 62.

Shell rather narrowly but deeply umbilicate, depressed trochiform carinated, rather solid, dull ashy-white; spotted with brown at the sutures, and ornamented with four or five narrow lines at the base and a reddish-brown band above the carina. Whorls five, nearly flat, rib striated, regularly increasing, the last whorl dilated, more convex, distinctly ribbed, encircled at the periphery with a white serrated carina, above which it is impressed; base flattened, rectangularly passing into the umbilicus; slightly deflexed in front. Aperture transversely ovate, distinctly angulate at the carina, the margins hardly converging; upper margin produced, lower margin having a distinct, deep seated brown lip, and slightly dilated at the insertion. (*Kob.*)

Alt. 5, greater diam. 10, lesser 9 mill.

Oran, Algeria, on cliffs; solitary and not easy to find.

H. ponsonbyi Kob., Jahrb. D. M. Ges. ix, 1882, p. 18; Rossm. n. f. iv, p. 21, f. 538.

This species forms a transition from the southern Spain group of *H. derogata* to the group of *H. amanda.*

H. barneyana Ancey. Pl. 44, figs. 90, 91.

Shell depressed, narrowly umbilicated (the umbilicus contained about 12 times in the diameter of the shell); solid, opaque, *chalk-white, more or less mottled with translucent, and having a narrow chestnut or translucent band above and a broad one below the periphery.* There are often several additional brown bands developed on

the base, and frequently the upper surface is suffused with brownish. Surface coarsely sculptured with rude, *irregular, oblique white riblets,* which distinctly crenulate the peripheral keel, and are much finer on the base.

Spire low-conic, apex light corneous, polished. Whorls 4½, slightly convex, slowly widening, the last strongly carinated at the periphery. Aperture oblique, transversely oval, somewhat lunate, peristome thin, not lipped within, the outer margin not angled at the position of the keel in adults.

Alt. 4⅓–4½, diam. 7½–8 mill.

Berrouaghia, Algeria.

H. barneyana Anc., WESTERL. Bull. Soc. Mal. Fr. 1888, p. 61.

A smaller species than *H. ponsonbyi* Kob., and much more strongly ribbed above. The specimens illustrated and described were sent by R. Jetschin. Specimens of the same species are before me, bearing Ancey's label "*H. Theodori* Ancey," and from the same locality. I have not seen this name in print and suppose it to be unpublished. There can be no doubt of the identity of the specimens with *barneyana.*

Section TURRICULA Beck.

H. TUBERCULOSA Conrad. (Vol. IV, p. 25). Pl. 27, figs. 67, 68, 69, 70.

Additional figures of this species are here given for comparison with the following forms. It is likely that *crenulata* Oliv. and *tuberculosa* are synonymous names, but the former was not sufficiently well figured by Olivier to decide with certainty. *H. tuberculosa* may be distinguished from *H. ptychodia, H. philammia* and *H. berenice* by the invariable presence of a series of tubercles on the upper surface of the whorl, midway between sutures, or suture and periphery.

H. PTYCHODIA Bourg. (Vol. IV, p. 25). Pl. 27, figs. 71, 72, 73, 74.

Better illustrations are here given, the figures representing specimens collected by G. Schweinfurth in 1885, at Gebel Gharebun, (between Cairo and the upper end of the Red Sea). Bourguignat's locality was the Isthmus of Suez. The *ptychodia* differs from *H. philammia* in (1) the greater width of the umbilicus at every stage of growth, (2) the more projecting, smooth, convex first whorl, (3)

the less rounded less steep intermediate whorls, which have, however the same sculpture, and (4) the last whorl descends less on the penultimate, the sculpture remains the same, or becomes only a little weaker; the peripheral angle and the more or less distinct but closer grains serrating it are retained nearly to the aperture, and the base is rather flat.

See v. Martens, Conch. Mittheil. iii, p. 1, t. 37, f. 9–15 (Dec., 1889.)

H. PHILAMMIA Bourg. (Vol. IV, p. 25). Pl. 27, figs. 61–66.

Bourguignat's description and figures were drawn from immature examples of this species. Von Martens has given illustrations of the adult form (figs. 61–63), collected by Schweinfurth in the region of Galala, Egypt, near the Red Sea, at an altitude of 1300 meters.

H. BERENICE Kobelt. Pl. 27, figs. 58, 59, 60.

Shell *trochoidal, narrowly umbilicated*, the umbilicus nearly concealed by the overhanging columellar lip; solid, chalky, lusterless, of a dirty buff color. Surface roughened by irregular growth-lines, the inner whorls inconspicuously malleated.

Spire conical. Whorls 6, those of the spire carinated, the *carina strongly crenulated, filling the suture*, and sometimes slightly projecting; *on the two latter whorls the carina is obsolete and the periphery rounded.* Latter half of the body-whorl slowly descending; base somewhat flattened.

Aperture rounded, slightly lunate, the breadth about equal to the oblique height; peristome simple, not thickened within, the columellar margin shortly dilated; parietal wall covered with a moderate callus.

Alt. 19, diam. 21½ mill.

Lybia (Spratt.)

This species is also illustrated from the type, in the collection of Ponsonby. It is somewhat allied to *H. lybica* and *H. tuberculosa*, but is much more intimately connected with *H. philammia* Bgt., of which it should probably be considered a variety.

H. LYBICA Kobelt. Pl. 27, figs. 53–57.

Shell *depressed*, umbilicated, the umbilicus deep, cylindrical, *one-tenth the diameter of the shell;* solid, chalky; slightly shining, of a dirty-white tint, the apex milk-white. *Surface superficially and finely pitted all over.*

Spire nearly flat, the apex somewhat projecting, consisting of 1¼ glossy, porcelain-white, planorboid whorls; the following whorls dull, roughened, *conspicuously crenulated at the sutures*, rapidly increasing; *last whorl either rounded at the periphery* (figs. 56, 57), *or keeled and crenate in front, then becoming rounded* (figs. 53, 54, 55); in either case, the jagged carina gives place to a shallow peripheral sulcus; base convex.

Aperture oval-lunate, slightly wider than high, oblique; peristome simple, thin, scarcely labiate within, the columellar margin shortly dilated; parietal callus very light.

Alt. 11, diam. 20 mill.

Alt. 10, diam. 19 mill.

Lybia (Spratt.)

The types of this hitherto unfigured species, from the collection of Mr. John Ponsonby, are here illustrated and described. The species is the most aberrant yet made known of the *H. tuberculosa* group; and in fact there is none approaching this in the greatly depressed contour. There are 5–5½ whorls in all.

Vol. IV, p. 30; for *H. sequentina* read *H. sequentiana.*

Section Fruticicola Held. (Vol. III, p. 170).

H. andria Martens. Pl. 45, figs. 34, 35, 36, 37.

Shell conoid-globose, narrowly perforated; striatulate and very delicately sculptured with distant narrowly lunate scales; gray-brown, unicolored. Spire conical, apex subpapillar. Whorls 5½, slightly convex, separated by a deep suture, the last whorl subangular at its beginning, then rounded, about equally convex above and below, deeply descending in front. Aperture oblique, rounded; peristome expanded, lipped with reddish or white inside, the margins joined by a distinct callus, lower margin arcuate, not dilated, the columellar triangularly dilated, partly covering the perforation. (*Mts.*)

Alt. 10½, greater diam. 15, lesser 12½ mill.

Alt. 8, greater diam. 13, lesser 11 mill.

Island of Andros, Ionian Archipelago.

H. (*Fruticicola*) *andria* Mts., Arch. Naturg. 1889, p. 181, t. 10, f. 5.

Very like *H. schuberti* Roth in size and appearance, but differing strongly in the peculiar sculpture, which reminds one of *H. incarnata.* When strongly magnified it seems to consist of crescentic scales

3 or 4 times as narrow as their interstices, and with the convexity directed backward, not toward the mouth; between them excessively fine spiral lines appear. (*Mts.*)

H. PROCLIVIS Martens. Pl. 46, figs. 52, 53, 54.

Shell narrowly umbilicated, subdepressed-globose, distinctly striatulate, corneous, the suture whitish. Whorls 5½, a little convex, the last rounded, deeply descending in front. Aperture broad-lunate, very oblique; peristome white-lipped within, opaque yellow outside, delicately expanded, margins subapproximating; columellar margin dilated at the insertion, partly closing the umbilicus.

Alt. 9½, greater diam. 14, lesser 11 mill. (*Mts.*)

Islands of Samos, Kalymnos, Kappari, Kos and Nisyros, and Asia Minor at Smyrna, etc.

H. proclivis Mts., Archiv für Naturg. 1889, p. 193, t. 10, f. 8. (August, 1889.)

The smallest specimens measured only 11 mill. diameter. Also found on the mainland at *Magnesia* (Maltzan) and *Smyrna* (Boettger), measuring 12–14½ mill. The species stands between *H. schuberti* Roth, which is more globular, with more circular, less oblique mouth, and *H. grelloisi* Bgt. (Amenit. ii, t. 5, f. 10–12) described from the Islands of the *Archipelago*, but this is decidedly flatter. A white sutural band is rather weakly developed by most but not all of the examples before me, as well as a pale peripheral band, as in so many Fruticicolas. (*Mts.*)

H. PISIFORMIS Pfr. var. ATYPA Bttg.

Shell more shining than the type, microscopic sculpture less strong, granules less distinct, last whorl ornamented with obsolete, especially at the suture, spiral lines. Color sometimes whitish.

Astrabad, Schah-rud, etc., Persia (Bttg., Zool. Jahrb. iv, 1889, p. 942.)

H. TRANSCASPIA Boettger. Pl. 45, figs. 31, 32, 33.

Similar to *H. sericea* and *rubiginosa*, but more allied to *H. pisiformis* and *arpatschiana*, from which it differs in the shortly hairy epidermis.

Shell narrowly umbilicated, conic-globose, subdepressed, horny-yellowish or rufous brown, either with short caducous hairs arranged in series forwardly descending, or yellowish, shining, very densely covered with pit-like scars. Spire more or less convex-conic, apex a

little acute. Whorls $4\frac{1}{2}$–$5\frac{1}{2}$, slightly convex, separated by an impressed suture, very distinctly and densely subcostulate-striate, the striæ especially at the sutures wrinkle-waved; last whorl very slightly subangulated in the middle, and uni-cingulate with whitish, shortly descending at the aperture and surrounded with an orange or yellow band there. Aperture very oblique, rather large, excised-subcircular, slightly wider than high, having a usually very strong white lip a distance within; peristome simple, acute, shortly reflexed at the columella, the margins widely separated. (*Bttg.*)

Alt. 8, greater diam. $11\frac{3}{4}$, lesser $10\frac{1}{4}$ mill.

Alt. $7\frac{1}{2}$, greater diam. $10\frac{1}{2}$, lesser 9 mill.

Alt. $5\frac{1}{2}$, greater diam. $8\frac{1}{2}$, lesser $7\frac{1}{2}$ mill.

Germab, in Kopet-dagh, and peaks in southern Askhabad, Transcaspia.

Helix (*Carthusiana*) *transcaspica* Bttg., Zool. Jahrb. (Abth. für Syst., Geog. u. Biol. der Thiere), iv, p. 943, t. 27, f. 12a-d. (Dec. 27, 1889.)

The shell varies greatly in size, color, thickness and strength of the lip-callus, being constant in the peripheral band and hirsuteness only; but in fully grown individuals the hairs seem to be lost, leaving a shining, densely pitted surface. The hairs are closer than in *rubiginosa* Schm., but they are shorter. The species resembles *Trichia* in the hairy coat, but *Carthusiana* in the thickened lip, etc.

H. semirugosa Kobelt. Pl. 40, figs. 52, 53, 54.

Nearly covered-perforate, depressed-globose, rather thin, subtranslucid, rudely and irregularly costate-striate, especially above; all over beset with short, yellowish, regularly arranged hairs; horny-rufous, with an obsolete whitish band. Whorls 6. Peristome very thin, with a very distinct white thickening rather deeply removed from the edge within; columellar margin reflexed vaultingly over the umbilicus.

Alt. 12, greater diam. 17, lesser 15 mill.

Mts. of Beni Hoznear, near Tetuan, Morocco.

H. (*Monacha*) *semirugosa* Kob., in Rossm. n. F. iv, p. 15, f. 529.

Reminds one strongly of *H. incarnata* Müll., but differs in the persistent hirsuteness.

H. rusicadensis Letourneux. Pl. 40, figs. 49, 50, 51.

Shell narrowly and compressedly perforate, depressed conic-globose, thin, translucent, the spire conoid, apex small, nearly flat;

rudely arcuately striated, little shining, unicolored, horny-rufescent, with obsolete pale peripheral zone; whorls 6, slowly and regularly increasing, separated by an impressed suture; the upper whorls slightly convex; last inflated, slightly subangulate in front, becoming rounded; descending at first slowly and then distinctly to the aperture. Aperture oblique, ovate-rotund, lunate; peristome thin, fragile, straight, very delicately lipped with white within; margins distant, columellar margin dilated at the insertion and reflected over the perforation. (*Kob.*)

Alt. 12, greater diam. 18, lesser 16 mill.

Eastern Algiers and Tunis.

H. rusicadensis Let., Kalybie, i, p. 222; Ann. Malac. i, 1870, p. 298.—Let. & Bgt., Prodr. Mal. Tunisie p. 8.—Kobelt, Rossm. Icon. n. f. iv, p. 80, f. 665.

H. zonitomæa Letourneux. Pl. 40, figs. 55, 56, 57.

Shell profoundly perforated, subglobose, thin, fragile, pellucid, obliquely rudely striated, hardly granulated; horny-white; apex buff, minute, smooth, somewhat projecting; spire depressed-conoid. Whorls 6½, slowly and regularly increasing, slightly convex, angulate, separated by an impressed suture; last whorl subangulate, the angle disappearing toward the aperture; base rounded, passing abruptly into the perforation; scarcely descending in front. Aperture ovate-rounded, lunate, produced above, oblique; peristome thin, straight, fragile, slightly and very delicately labiate, margins distant, joined by a very thin callus; columellar margin slightly expanded above the perforation. (*Kob.*)

Alt. 15, diam. 22 mill.

Kalybie.

H. zonitomæa Let., Exc. en Kalybie, in Ann. Mal. ii, p. 38, f. 15–17.—Kobelt, Rossm. Icon. n. f. iv, p. 81, f. 666.

Allied to *H. faidherbiana* Bgt.

Unfigured species of Fruticicola.

Helix pedemontana Pini, Atti Soc. Ital. Sci. Nat. xxvii, p. 248. Near *rufescens* and *telonensis*.

Helix erithrocheila Sulliotti, Bull. Soc. Mal. Ital. xiv, p. 40, is a new name proposed for *Helix rufolabris* of authors, not *rufilabris* Jeffr.

HELIX (TRICHIA) CHRYSOTRICHA Bttg., Nachr.-Bl. D. M. Ges. 1888, p. 151. Forests of the mountain-group Oschten-Fischt, Caucasus.

HELIX PONSONBYI Westerl., Bull. Soc. Mal. Fr. 1888, p. 57. Tangier. Allied to *H. revelata.* There is a prior *ponsonbyi* of Kobelt, in *Jacosta.*

H. TÆNIATA Westerl., Bull. Soc. Mal. Fr. 1888, p. 58. Mogador.

H. INVERSA Westerl., ibid., p. 59.

H. HIERICONTINA Westerl., ibid., p. 60. Jerico.

H. LENTIACA Sayn, Bull. Soc. Mal. Fr. 1888, p. 152, Dept. Drome, France. Between *H. villosa* and *H. montana.*

Section LEJEANIA Ancey.

This group is anatomically closely allied to the European Fruticicolas, as Issel has shown. Most of the species have hitherto been included in *Pella* (see p. 135, where the species are enumerated). Another member of the group is the unfigured *Helix leucosticta* Martens (Nachrichtsbl. D. M. Ges. 1889, p. 147) from Menaha and Uossil, Southern Arabia.

H. SCIOANA Pollonera. Pl. 45, figs. 5, 6, 7.

Shell thin, pellucid, yellowish-horn colored with a brown band, hairy, moderately umbilicated; flattened above; sub-costulate, the apex slightly acute, whorls 4, flattened above, the last obtusely carinated above the periphery, with a rather wide tawny band, and in adults not hairy. Aperture subangulate-lunate; peristome straight, simple, acute, very fragile, the columellar margin very shortly reflexed at the umbilicus. Alt. 3½, diam. 6 mill. (*Poll.*).

Station of Let-Marefia, near Ankober.

Fruticicola scioana POLL., Bull. Soc. Mal. Ital., xiii, 1888, p. 76, t. 2, f. 28–30 (shell) and t. 3, f. 22–24 (anatomy).

H. STRIGELLOIDES Pollonera. Pl. 45, figs. 9, 10, 11.

Shell rather depressed, fragile, corneous, zoned with whitish; narrowly umbilicated, deeply striated above, lightly below. Spire convex, the apex minute, smooth; whorls 5, regularly increasing, the last rounded, having a carinal whitish line and a zone of whitish below; aperture little-oblique, lunate, subcompressed above; peristome acute, very slightly patulous, not thickened within, the columellar margin reflexed. Alt. 9, diam. 14½ mill.

Let-Marefia.

Fruticicola strigelloides Poll., Bull. Mus. Zool. Ecc. Torino, ii, 1887; Bull. Soc. Mal. Ital., 1888, xiii, p. 77, t. 2, f. 25–27.

Section Metafruticicola v. Ihering.

Pseudocampylæa Hesse, Jahrb. D. M. Ges. 1884, p. 237; Tryon, Manual of Conch. (2) iv, p. 114 (part), and of other authors. Not of Pfeiffer, Mal. Bl. xxiv, p. 8, 1887.—*Cressa* Westerlund, Fauna Palaäarct. Reg. Binnen-Conch., *Helix*, p. 4, 101, 1889. Not *Cressa* Böck, 1871 (*Amphipoda*).—*Metafruticicola* Iher., Zeitschr. f. Wissensch. Zool. liv, p. 452 (Oct. 4, 1892).

This section consists of snails between *Fruticicola* and *Campylæa* in shell characters, but having the genital system free from accessory organs, probably by degeneration. The species are confined to Crete and the adjacent islands.

H. lecta Ferussac (Vol. IV, p. 116) Pl. 34, figs. 62, 63, 64. The figure given in Vol. IV represents *sublecta* Maltzan.

H. dictaea Martens. Pl. 25, figs. 16, 17, 18, 19.

Shell narrowly umbilicated, depressed globose, radiately costulate-striate, beset with short, erect rigid hairs; brown-tawny, unicolored. Spire little projecting; whorls hardly 5, slightly convex, the suture rather deep; last whorl inflated, rounded, descending at the aperture, paler. Aperture very oblique, broad-lunate, the peristome very lightly expanded, white-lipped within, the margins approximating, upper lightly, basal distinctly arcuate, columellar margin strongly dilated, covering a small part of the umbilicus.

Alt. 10, diam 16½ mill. (*Mts*).

Southern side of the Lasithi Mts., near Viano, Crete.

Helix (*Pseudocampylæa*) *dictaea* Mts. Archiv für Naturg., 1889, p. 186, t. 3, f. 7.

Similar in general, especially color and hirsuteness, to *H. pellita*, but distinguished from it by the complete want of a band, more depressed spire, and wider mouth.

H. testacea Martens. Pl. 46, figs. 55, 56, 57.

Shell perforate, globose, rather solid, subobliquely closely wrinkle-striate, tawny, paler at suture and periphery; above with a distinct, below a vanishing, brown band. Whorls 5½, slightly convex, the last rounded, suddenly and deeply falling in front. Aperture very oblique, subcircular; peristome narrowly expanded, thin, diaphan-

ous, strongly white-lipped within, the margins approximating, joined by a white callus (*Mts.*).

Alt. 14, greater diam. 19½, lesser 16½ mill.; apert. width 11, oblique alt. 10 mill.

Alt. 10–11. greater diam. 15, lesser 12½ mill.; aperture width 8½, oblique alt. 7 mill.

Island of Kasos (near Crete).

H. (*Pseudocampylœa*) *testacea* Mts., *t. c.*, p. 194, t. 10, f. 6.

Most nearly allied to *H. pellita*, but larger, without hairs when grown, more globular, coarsely striated and somewhat granulated, brownish yellow, with a light band at the periphery between two darker narrow bands, the lower one more variable, sometimes hardly indicated. Young examples show short hairs, as in *pellita;* and when quite young it is carinated. This species may be one of the forms included by Férussac in his *H. naxientia*=*naxiana*.

Unfigured Species.

Helix (*Cressa*) *medea* Westerlund, Verh. k. k. zool.-bot. Ges. Wien, xlii, p. 45. Crete.

Helix (*Cressa*) *giurica* Bttg., Nachr.-bl. d. d. Mal. Ges., 1892, p. 59. Island of Giura, Grecian Archipelago.

Section Plectotropis Alb. (Vol. IV, p. 51.)

Plectotropis Alb., Die Hel., edit. Martens, p. 121—v. Milldff., Nach.-bl. d. d. Mal. Ges., 1884, p. 315.

The relationships of this group are still unknown. It may prove to be entirely distinct from the genus *Helix*, in which I consider it best to locate it for the present.

H. pilisparsa Martens. *Unfigured.*

Similar to *H. gabata* Gld., but the three upper whorls do not rise one above another; the color is pale greenish-gray, the suture marked with a chestnut-brown band, the keel of the last whorl of the same color as the rest of the shell; reflected part of the peristome about 2 mill. broad; umbilicus having more sloping walls. Surface beset with short hairlets above and below.

Alt. 10, diam. 23 mill.

Minahassa, N.-E. Celebes.

H. pilisparsa Mts., Sitzungsber. d. Gesellsch. naturf. Freunde in Berlin, 1885, p. 192; Journ. Linn. Soc., xxi, p. 162.

Martens adopts the sectional name *Philidora* for this and *H. gabata* Gld.

H. MACKENSII Adams and Reeve. Pl. 52, fig. 53.

One of the original figures is here reproduced, for comparison with the following forms. The figure given in Vol. IV, pl. 11, fig. 34, is a copy of the original figure of the face of the shell.

Var. MYSTAGOGA Mabille. Pl. 52, figs. 54, 55.

This is a smaller form than the typical *mackensii*. My figures are drawn from the type in collection l'Abbe A. Vathelet.

China.

Helix mystagoga J. MABILLE, Bull. Soc. Philomath. de Paris. 1887–1888, p. 73.

Var. VULGIVAGA Schm. and Bttg. Pl. 52, figs. 56–60.

Differs from typical *mackensii* in the greater width of the umbilicus, five-sixteenths the diameter of shell; the smaller more solid, shell always corneous-yellowish, the spire always higher, more or less elevated; last whorl distinctly deflexed in front; aperture generally less angulated above.

Alt. 12–13, greater diam. 24–25½ mill.; alt. of aperture 9, width 8¾ mill. (*S. & B.*)

Kobe, Niphon, Japan.

H. (*Plectotropis*) *mackenzii v. vulgivaga* S. & B., Nachr.-bl. d. d. Mal. Ges. 1890, p. 136.—H. *mackensii* KOBELT, Faun. Jap., p. 19, t. 2, f. 1–2.

H. SHERMANI Pfr. *var.* LAUTSI Schmacker & Boettger. Pl. 53. figs. 63, 64, 65.

Shell moderately umbilicated, (umbilicus about one-sixth the diameter of shell) conic-depressed, acutely carinated; horny-yellowish, thin. Spire little elevated, slightly convex conic; apex slightly obtuse. Whorls 6½–7, nearly flat, separated by an impressed, delicately white hair-lined suture; lightly striatulate and very densely spirally lineolate; the last whorl having a subcompressed whitish carina, somewhat flattened below, spirally impressed at the carina, rather sloping at the umbilicus, very little deflexed in front. Aperture very oblique, rounded rhombic, the right margin angled, terminations of lip very widely separated, the upper slightly reflexed, little arcuate, the lower curved, reflexed,

little thickened, columellar margin subvertical, much prolonged triangularly above.

Alt. 9–10½, greater diam. 18–22, lesser 16–19½ mill.; apert., alt. 7–8½, width 9½–10½ mill. (*S. & B.*)

South Cape of Formosa.

Helix (*Plectotropis*) *lautsi*, S. & B., Nachr.-bl. D. M. Ges., 1890, p. 4, t. 1, f. 1.—*H.* (*Plectotropis*) *shermani* var. *lautsi* S. & B., *l. c.*, 1891, p. 154.

Compared with *H. mellea* Pfr., this species has more whorls and more oblique aperture. It is more sharply keeled than *H. mackensii* Ad. & Rv., thinner shelled, flatter on the base, not swollen around the umbilicus as in *mackensii*, and the umbilicus is narrower. These characters also separate it from *H. trichotropis* and *H. gerlachi*, between which it stands somewhat intermediate. Fresh examples will be found to have a fringe of hairs at the keel.

Var. BRACHYLASIA Schmacker & Boettger.

Shell higher, spire more conic, whorls spirally lineolate and sparsely beset with extremely short hairs, the scars weak, at the carina and in the umbilicus distinctly sculptured, as if subgranulose.

Alt. 7½–8½, diam. 13–15 mill. (*S. & B., l. c.*, p. 156).

Takao.

H. SQUARROSA Gould. Pl. 53, figs. 66, 67.

This species was briefly described by Gould from Oosima, Japan. Schmacker has identified with it, I believe correctly, a form from Nagasaki, which is here figured. See Nachr.-bl. d. d. Mal. Ges., 1890, p. 6, t. 1, f. 2.

Unfigured species of Plectotropis.

Trochomorpha fritzei Bttg., Nachr.-bl. d. d. Mal. Ges., 1892, p. 160. Kinmura, of Okinawa, middle Liukiu. Boettger is disposed to group this and *H. cathcartæ* in *Trochomorpha*, but they are more likely to belong here, in the writer's opinion.

H. ningpoensis Bttg. *l. c.* p. 161. Ningpo.

H. pandynama J. Mabille, Bull. Soc. Philomath. de Paris, 1883–84, p. 48. Thibet. Near Stoliczkana.

H. desgodinsi Bgt. *l. c.*, p. 49. Thibet.

Section ÆGISTA Albers.

H. MITANENSIS Godwin–Austen. Unfigured.

Shell globosely pyramidal, openly umbilicated, sculpture smooth, the shell covered with a thick epidermis, having a finely papillate structure; color dark olive-green or pale umber; spire conic, high, apex blunt; suture impressed; whorls 6, rather convex and rounded below, the last descending abruptly at the aperture; aperture circular; peristome strong, white, with a sinuate margin above; columellar margin oblique.

Size, maj. diam. 10·9, min. 9·4; alt. axis 6·7, body-whorl 5·2 mill.

Animal with dark tentacles, long and fine; body papillate near the head, pale, dusky on the upper surface; foot short behind and pointed. In some specimens the head and tentacles were jet black, the rest of the body pale indigo (*G.-A.*)

Mitan, under Moo-le-it Range, Moulmein.

Helix (*Ægista*) *mitanensis* G.–A., Ann. Mag. Nat. Hist. (6), iii, p. 108, Feb., 1889.

H. GRUMULUS Godwin–Austen. Pl. 56, fig. 9.

Shell depressedly conoid, keeled, widely umbilicated; sculpture a rough epidermis covered with small spots in relief; the periphery set with regular, short, thick-based hairs; color ochraceous; spire flatly pyramidal; side slightly convex; apex rounded, suture shallow; whorls 5, sides flatly convex; aperture semilunate; peristome slightly reflected, columellar margins subvertical.

Size, maj. diam. 8·5, min. 7·8; alt. axis 3·5 mill. (*G.–A.*)

Borneo (in spirit), exact locality unknown (A. Everett).

Helix (*Ægista*) *grumulus* G.–A., P. Z. S. 1891, p. 43, t. 5, f. 2.

This is the nearest approach to *Helix huttoni* group of India that I have seen from this island; the odontophore is like that of *Helix;* the mantle margin is simple. (*G.–A.*)

H. PUDICA Godwin–Austen. Pl. 56, figs. 17, 18.

Shell depressedly conoid, subangulately keeled, narrowly umbilicated, hidden by the columellar reflection; sculpture a slightly roughened or shagreen-like surface; color pale ochraceous, with a snowy-white peristome; spire flatly conoid, low; apex rounded; suture shallow; whorls 4, sides flat, a shallow depression near the

periphery; aperture semilunate; peristome reflected on outer margin, and thickening toward columellar which is oblique.

Size, maj. diam. 20·0, min. 15·8; alt. axis 7·75 mill. (*G.–A.*)

Labuan (Sir H. Low, in Coll. Dr. Hungerford).

Helix (*Ægista*) *pudica* G.–A., P. Z. S. 1891, p. 43, t. 2, f. 7.

H. KOBENSIS Schmacker & Boettger. Pl. 52, figs. 61, 62.

Allied to *H. friedeliana* v. Mts. of Liu-Siu Islands, differing in being more solid, umbilicus much wider, the 6 whorls not at all scaly; aperture much smaller, ovate instead of circular, margins thickly white-lipped, the upper less arcuate. Umbilicus about $\frac{1}{3}$ the width of the shell (being about $\frac{1}{4}$ in *friedeliana*). Subconoid depressed, rather solid, uniform horny-olive. Spire low, depressed conic convex, the apex rather obtuse. Whorls 6, slightly convex, separated by an impressed suture, obliquely striated, hardly squamiferous, the last whorl somewhat more convex below, the periphery not angled at its origin, entirely rounded, slowly descending in front. Aperture small, very oblique, ovate, wider than high; peristome thickened, expanded and reflexed, white, margins converging, the upper sloping, little arcuate.

Alt. 6–7½, diam. 13½–15½ mill.

Kobe, Niphon, Japan.

Helix (*Ægista*) *kobensis* S. & B., Nachr.-bl. d. d. Mal. Ges. 1890, p. 135.

Section ~~PSEUDIBERUS Ancey (Vol. IV, p. 58)~~.

The following probably belong here, although they differ from *H. tectumsinense* in being thin and corneous.

H. MARIELLA H. Adams. Pl. 55, fig. 23.

Shell openly umbilicated, depressed lens-shaped, thin, subarcuately irregularly rugose striate, and under a lens very minutely granulated; pale tawny. Spire a little convex; suture margined. Whorls 4½, the last shortly descending, carinated, the carina acute and compressed, whitish; base more convex; umbilicus moderate, deep. Aperature very oblique, angulate oval; peristome expanded, whitish, the margins close, joined by a thin arcuate callus, the basal margin slightly thickened.

Alt. 7½, greater diam. 18, lesser 16 mill. (*H. Ad.*).

Itchang and Fungsiang Gorges, Yangtze River, China.

H. (*Plectotropis*) *mariella* H. Ad. P. Z. S. 1870, p. 377, t. 27, f. 5.—*H.* (*Cathaica*) *mariella* Mlldff.—*Helix mariella* Heude, Moll. Terr. Fl. Bleu, p. 108, t. 28, f. 8, 8 a.

Heude has given figures of a form with flatter spire and more obtuse apex, which may be called var. *submariella* (pl. 55, figs. 27–30).

A variety *aquila* is described by H. Adams as being smaller, tawny, with higher spire, the last whorl less convex. This may be the same as *H. innominata* Heude.

H. innominata Heude. Pl. 55, figs. 24, 25, 26.

Shell rather narrowly umbilicated, depressed *lens-shaped*, being about equally convex above and below the *acute white peripheral keel*; reddish-brown, fading to horn-colored around the umbilicus and at the lip.

Spire conical; whorls 4½, *separated by deeply channelled sutures*; the inner 1½–1¾ whorls convex, forming an elevated but rather obtuse nuclear shell, which is bluntly if at all angular at the projecting periphery; following whorls finely marked by oblique growth-lines, shining, convex, becoming *concave above the peripheral keel, which projects on all the whorls.* Last whorl descending to the aperture; base convex, microscopically and superficially granulated. Aperture very oblique, oval, the peristome thin, expanded above, reflexed beneath and at the umbilicus, its terminations converging and joined by an adnate parietal callus. *Width of the umbilicus contained* 7–8 *times in the diameter of the shell.*

Alt. 6, diam. 12 mill.

Alt. 6½, diam. 14½ mill.

Kin-cha, Kiang River, China.

Helix innominata Hde., Moll. Terr. Fl. Bleu, p. 108, t. 28, f. 7.

Described from specimens received from Heude. Compare *H. mariella* Ad.

Section Aulacospira v. Möll., 1890.

The following key is given by v. Möllendorff:

Key to Species.

a. Carina extending to the aperture; peristome continuous, free; section *Micropetasus.*

b. Edentulous, spire much depressed, scarcely raised. *mucronata.*

bb. Aperture having teeth, spire more elevated.

c. 1-toothed, trochiform. *hololoma.*

cc. 4-toothed, spire depressed-scalariform. *scalatella.*

aa. Next to the last whorl distinctly deviating, the last not carinated, cylindrical; aperture 5-toothed; peristome not continuous, margins converging. Section *Pseudostreptaxis.* *azpeitiæ.*

H. HOLOLOMA v. Möllendorff. Pl. 54, figs. 89, 90.

Shell narrowly umbilicated, trochiform, carinated, above sculptured with minute very oblique riblets, the base subglabrous, corneous-brown. Spire conoid, apex mamillar, slightly obtuse, shining; whorls 5½, convex, the last subacutely carinated, deeply sulcated above the carina, the base slightly convex; deflexed in front. Aperture extremely oblique, angulate-elliptical, the peristome thin, continuous, free, expanded in every part, hardly reflexed; columella thickened, ornamented with a tooth-like nodule.

Alt. 2½, diam. 3 mill. (*v. Moll.*)

Limestone cliffs of the peak of Mt. Licos, Zebu, Philippines.

Helix hololoma v. MOELL. Jahrb. d. m. Ges., 1887, xiv, p. 275, t. 8, f. 12.—*Aulacospira* (*Micropetasus*) *hololoma* v. MOELL., Landschn. Cebu, p. 225.

H. MUCRONATA v. Möllendorff. Pl. 54, figs. 91, 92.

Shell perspectively umbilicated, much depressed, discoidal; sculptured above with oblique, subdistant very minute riblets, the base striatulate, subglabrous, pale horn colored. Spire very shortly elevated, the apex projecting, mamillar. Whorls 4, slightly convex, separated by a profound suture and a deeply excavated spiral sulcus. Last whorl angulated at the periphery, flat below, shortly deflexed at the aperture. Aperture extremely oblique, angulate-elliptical, the peristome thin, continuous, solute, expanded in every part, hardly reflexed. Alt. 1, diam. 3 mill. (*Mlldff.*)

Mt. Uling and Mt. Licos, and on the west coast near Balamban and Tubaran, Zebu, Philippine Islands.

Helix mucronata v. MOELL., J. d. m. Ges. xiv, p. 276, t. 8, f. 13–13b.—*Aulacospira* (*Micropetasus*) *mucronata* v. MOELL. Landschn. Cebu, p. 225.

This species lives on nearly inaccessible limestone cliffs, in the chinks and rifts of which its flat shell enables it to crawl.

H. SCALATELLA v. Möllendorff.

Shell rather openly umbilicated, depressed, thin, obliquely striatulate, horny-brown. Whorls 4, flat above, obtusely angulated at the periphery, subsolute, forming a depressed scalariform spire, the last whorl more convex beneath, deflexed in front, shortly solute. Aperture oblique, rounded-rhombic, with four coarctate teeth, one longer on the parietal, with short ones on the outer, basal and columellar margins (*Mlldff.*)

Alt. 1·75, diam. 2·5 mill.

Village of Antipolo, Province of Manila, Luzon.

Helix scalatella MLLDFF. Nachr.-bl. d. m. Ges., 1888, p. 145.

H. AZPEITIÆ Hidalgo. Pl. 54, fig. 93.

Openly umbilicate, convex depressed, thin, slightly striatulate, not shining, a little pellucid, corneous-brown. Spire irregular, depressed scalariform, the apex rather acute; suture simple; whorls 5, flat above, obtusely angled at the periphery, the angle projecting above the suture. Last whorl convex beneath, rounded or slightly angled at the periphery, not deflexed in front, not solute; subconstricted behind the aperture. Aperture subrotund, having 5 pliciform teeth, one on the parietal wall long and oblique, another on the columella, transverse, the others are smaller, nodular, situated on the basal and outer margins, sometimes wanting; peristome simple, expanded, the margins approaching, joined by a very thin callus, the right margin elongated and horizontally adnate above, very obtusely angulate; columellar margin elongately dilated at the insertion (*Hid.*).

Alt. 2, diam. 3 mill.

Penón de Bintuan, Busuanga, Philippines.

Helix azpeitiæ HIDALGO, Obras mal. i, p. 120, t. 1, f. 10.

Section SATSUMA Adams (Vol. III, p. 217).

H. EUMENES Westerlund. Pl. 53, figs. 86, 87, 88.

Shell openly and deeply umbilicated, globose-conic, rather thin, whitish, obliquely striatulate, under a lens seen to have dense spiral lines. Spire exserted, convex conic, slightly obtuse, somewhat terraced, the suture rather deep. Whorls 6½, regularly increasing, slightly convex, the last rounded, descending in front

Aperture oblique, round lunate, the margins converging; peristome expanded, the columellar margin dilated at the insertion.

Alt. 11, greater diam. 14, lesser 12 mill. (*W.*).

Mizu on Kiusiu, Japan.

Helix eumenes WESTERL., in Vega-Expeditionens Vetenskapliga Iakttagelser, iv, p. 197, t. 3, f. 8 (1887).

Belongs to the group containing *H. hilgendorfii* and *macrocycloides* Kob., *goodwini* Sm., and *proba* Ad.

H. TROCHACEA Gredler. Pl. 53, fig. 77, 78.

Shell rather openly umbilicated, trochiform, thin corneous-tawny, with a pearly lustre; unequally and very obliquely, broadly and strongly striated; above almost invisibly, below very densely spirally striated. Spire conoid, apex obtuse. Whorls 7½, slowly increasing, slightly convex, slightly terraced at the deep sutures, the last whorl acutely angulated at the periphery, convex beneath, shortly descending in front. Aperture oblique, ovate subcircular, flesh-colored inside; peristome thin, margins converging, the superior curving forward, expanded, the columellar very narrowly reflexed at the umbilicus.

Alt. 8–9, diam. 10½–11 mill. (*Gred.*).

Hensan (Hen-san-shien), China.

Helix (Fruticotrochus) trochacea GREDLER, Zur Conchylien-Fauna von China, viii Stück, p. 7, Bozen, 1885; Annalen des k. k. naturhist. Hofmus. ii, p. 584, t. 11, f. 18, 19 (1887).

H. SPHÆROCONUS Pfeiffer. Pl. 53, figs. 75, 76.

Shell narrowly rimate, elevated globose-conic, rather solid, light straw-colored with a brown line at the periphery, bordered below by a pale line. Whorls about 7, slightly convex, the last rounded at the periphery and beneath, hardly descending in front. Aperture irregularly rhombic, somewhat oblique; outer lip hardly expanded, arcuate at the upper insertion, then peculiarly bent inward; basal lip arcuate, subexpanded; columella vertical, broadly reflexed over and almost concealing the umbilical perforation.

Alt. 23, diam. 18 mill.

Alt. 30, diam. 20 mill.

Formosa.

Bulimus sphæroconus PFR., P. Z. S, 1865, p. 830, t. 46, f. 3; Mal. Bl. xiii, 1866, p. 43; Monographia vi, p. 75.—*Cochlostyla (Phoenicobius) sphæroconus* PFR. & CLESS., Nomencl. Hel. Viv. p. 210.

The largest of the Satsumas. Fig. 75 represents Pfeiffer's type, in which the lip is less bent inward above. The specimens before me correspond with fig. 76, and this form with strongly sinuous outer lip is probably varietally distinct, and may receive the name var. *campochilus*.

H. MICROTROCHUS v. Möllendorff. Pl. 53, figs. 79, 80, 81.

Shell openly umbilicated, globose-trochoidal, obliquely plicate-striatulate, decussated with very fine spiral lines, somewhat shining, horny-brown. Spire convex-trochoidal, the apex rather acute. Whorls 7, slightly convex, the last very obtusely angled at the periphery, a little deflexed in front. Aperture oblique, rounded lunar, the peristome narrowly expanded, a little reflexed, sinuous; columellar margin forming an obtuse angle with the basal margin (*v. Moell.*)

Alt. 7¼, greater diameter 10¼, lesser 8¾ mill.

Alt. 6½, greater diam. 10, lesser 8½ mill.

Alt. 7, greater diam. 9½, lesser 8 mill.

Province Gui-dshou, China.

H. (Satsuma) microtrochus v. MLLDFF., J. D. M. G., xiii, p. 195, t. 6, f. 6.

Reminds one somewhat of *H. lepidostola v. trochospira*, but is higher, the last whorl is nearly rounded, and the whorls are more convex. The cuticle, moreover, is rather shining, lacking all trace of cuticular riblets, and the spiral lines are visible only under a strong lens (*Mlldff.*).

H. TROCHUS v. Möllendorff. Pl. 53, figs. 84, 85.

Shell half-covered perforate, elevated trochiform, acutely keeled, transversely curved-striatulate, minutely granulose, pale horny-brown. Spire regularly conical, the apex obtuse. Whorls 7, nearly flat, the last very slightly descending at the aperture, base very slightly convex. Aperture oblique, angulate-elliptical, the upper margin hardly expanded, outer and basal margins moderately expanded, the columella broadly expanded, slightly reflexed, rose-white. Alt. 13, diam. 11 mill. (*v. Möll.*).

Mt. Uling, and west coast of Zebu, Philippines.

Helix (Satsuma) trochus v. MOELL., Jahrb. d. m. Ges. xiv, p. 274, t. 8, f. 10, 10a; Landschn. Cebu, p. 222.

H. TROCHOMORPHA v. Möllendorff. Pl. 53, figs. 82, 83.

Shell rimate, conic-turrited, with a thread-like carina; minutely granulated by transverse striæ and spiral lines; pale horny-brown; spire elongated conic, the apex slightly obtuse. Whorls 6, slightly convex, the last not descending, moderately convex beneath. Aperture oblique, angulate-rounded, the upper margin hardly, outer and basal moderately, columellar broadly expanded, white, margins joined by a very thin callus.

Alt. 4¼, diam. 3 mill. (*v. Moell.*).

Mts. Licos and Uling, Zebu; Siquijor; Leyte, Philippines.

Helix (*Satsuma*) *microtrochus* v. MOELL., Jahrb. d. m. Ges. xiv, p. 275, t. 8, f. 11–11b (not *H. microtrochus* Möll. Jahrb. xiii, p. 195). —*H.* (*Satsuma*) *trochomorpha* v. MOELL. Mal. Bl. n. F. x, p. 157. —*Satsuma trochomorpha* v. MOELL., Landschn. Cebu, p. 222.

The form from Leyte is a small variety.

H. FERNANDEZI Hidalgo. Pl. 53, figs. 68, 69.

Shell nearly covered perforate, trochiform, thin, shining, nearly smooth (under a lens seen to be decussated with incremental and transverse striæ,) pellucid white under a very thin buff epidermis. Spire elevated, conoid, the apex obtuse; suture simple. Whorls 7, nearly flat, the last convex beneath, carinated at the periphery, a little descending and subconstricted in front. Aperture oblique, subquadrangular, angulated at the termination of the carina; peristome thin, the margins joined by an indistinct, very thin callus, the upper margin expanded, basal a little reflexed, columellar dilated, nearly closing the perforation (*Hid.*).

Alt. 13½, diam. 15½ mill.

Busuanga, Island of Busuanga, Philippines.

Helix fernandezi HID., Journ. de Conch., 1889, p. 299, t. 13, f. 4; Obras Malacol., i, p. 52, 142.

The carina of the last whorl ascends the spire and is visible immediately above the sutures of the other whorls. Under a lens it appears very finely crenulated above, but not on the edge (*Hid.*).

H. PLANASI Hidalgo. Pl. 53, figs. 73, 74.

Shell narrowly umbilicated, trochiform, thin, pellucid, finely sculptured with oblique plicæ; horn-colored. Spire elevated, concave conic, the apex obtuse, brownish. Whorls 6, the earlier 2 a little convex, smooth, the rest flat; the last whorl very acutely car-

inated at the periphery, little deflexed in front, convex on the base. Aperture transversely lunar, angulated; peristome concolored, the terminations joined by a very thin rather indistinct callus; the superior margin expanded, basal margin reflexed, columellar dilated, half covering the umbilicus (*Hid.*).

Alt. 15, diam. 22 mill.

Penon de Bintuan, Island of Busuanga, Philippines (Quadras).

Helix planasi HID., Journ. de Conch., 1889, p. 300, t. 13, f. 3; Obras Malacol. i, p. 52, 142.

This species has entirely the form of *Trochomorpha cacuminifera* Bens. (Rve. *Conch. Icon. Helix*, f. 744, and Hanley, *Conch. Indica*, t. liv, fig. 4), but it is more depressed below, and wider at the base; it has 6 instead of 8 whorls, and the sculpture is different. The surface-folds are visible beneath as well as above, this part being smooth in *Tr. cacuminifera* (*Hid.*).

H. HYPERTELEIA Morlet. Pl. 53, figs. 70, 71, 72.

Shell narrowly and deeply umbilicated, discoidal, covered with a thin horn-colored epidermis; upper surface flattened, conic, not shining; lower surface convex. Spire acute and projecting; whorls 8, flattened, regularly increasing, separated by a margined suture, finely granulous on the radiating riblets. The first two whorls are papillose, yellowish, smooth, the third whorl is pale ashen; the rest are ornamented with radiating oblique folds crossed by very fine spiral threads, and are of a whitish color with a narrow median brown zone; last whorl not descending, acutely keeled at the periphery, the keel finely crenulated; base whitish, with a narrow brown zone, having radiating striæ which become obsolete toward the umbilicus, and are crossed by very delicate concentric threads. Aperture semilunar, the terminations of the peristome connected by a thin callosity; lip subreflexed, basal margin reflexed, white (*Morl.*)

Alt. 9, greater diam. 21½, lesser 19 mill.

Kham-Keute, Laos (Massie).

Helix (*Plectotropis*) *hyperteleia* L. MORLET, Journ. de Conch. xl, p. 82, 1892; *l. c.* p. 316, t. 6, f. 2*a-b*.

This peculiar species is referred by Morlet to *Plectotropis*, but we incline to the belief that it is a true *Satsuma*.

H. EDITHA A. Adams. *Unfigured.*

Testa depresso-conoidali, late perforata; spira elatiuscula, obtusa, apice obtusa; anfract. 6, convexiusculis, oblique strigosis et striis volventibus confertis decussatis; anfractu ultimo ad peripheriam rotundato, ad basim planiusculo; apertura obliqua, lunata; peristomate subexpanso, reflexo, intus vix incrassato. Albida, fasciis duabus rubro-fuscis in anfractu ultimo et fascia unica ad suturas ornata.—Lat. 8½, alt. 4 lin. (Ad.)

Island of Risiri, Vladimir Bay, Japan.

Helix editha (Camena) A. ADAMS in Ann. and Mag. n. H. 4th. ser. i, 1868, p. 462.

Very similar to *H. pyrrhozona* Phil., but the spire is more elevated, and the form more conoidal.

Section CATHAICA Mlldff.

Cathaica MLLDFF., Jahrbücher des Deutschen malakozoologischen Gesellschaft, 1884, p. 339. Type *H. pyrrhozona* Phil.

An extensive group of Helices, confined mainly to China, related to *Eulota*, *Satsuma*, *Euhadra*, *Pseudiberus* and *Ægista*,—all being East Asian manifestations of the great group of true *Helices*, represented in Europe by the Fruticicoloid, Xerophiloid and Pentataeniate snails.

There is a genus *Cathaicus* Bates, 1870, in Coleoptera, but the two names are sufficiently different.

The following arrangement is substantially that of von Möllendorff.

(*Dextral species.*)

H. PYRRHOZONA Philippi. Pl. 47, figs. 60–63.

Shell solid, umbilicated (the umbilicus about *one-eighth* the greatest diameter, and rapidly narrowing to a narrow, deep perforation); depressed above and below, the spire low-conoid. Color white, rather opaque, with a broad chestnut-brown band at the periphery, and a faint brownish band below the suture. Surface shining, sculptured above with close rib-striæ, becoming more delicate below. Whorls 5½, the earliest 1½ smooth, shining, forming a subacute apex; following whorls slightly convex, slowly increasing, separated by an impressed suture. Last whorl much wider, rounded at the periphery, hardly descending in front. Aperture slightly oblique,

lunate-oval; peristome a trifle expanded, having a strong white lip within, often subdentate on the straight basal margin.

Alt. 8½, diam. 15 mill.

China.

Helix pyrrhozona PHIL., Abbild. ii, p. 2, Helix t. 6, f. 4.—PFR. in Conchyl. Cab., t. 79, f. 7–9; Monogr. i, p. 350—REEVE Conch. Icon., t. 85, f. 455.—MARTENS, Ostas. Landconch. p. 48.—ADS., Am. Mag. N. H. (4), i, p. 461.—MLLDFF., Jahrb. d. m. Gesell. ii p. 130, 217, 1875.—WIMMER, Ueber die Identität der Helix fasciola Drap. und der H. pyrrhozona Phil., in Sitzungsberichte der k. k. zool.-bot. Ges. Wien, xxviii, p. 44, 1878.—HILBER, Sitzungsber. Math.-Naturwissensch. Classe der k. Akad. der Wissenschaften, lxxxvi, p. 345, t. 3, f. 8. 1883.—HEUDE, notes sur les moll. Terr. de la Vallée du Fleuve Bleu, p. 43, t. 16, f. 7, 8.—*H. faciola* DRAP., Hist. Nat. Moll. terr. et fluv. de la France, p. 110, t. 6, f. 22–24; *H. fasciola*, on explanation of plate.—MABILLE, Rev. et. Mag. Zool. xxiii, p. 49, 1872.

A well known and very widely distributed Chinese species.

H. GRÆSERI Mousson. Pl. 47, figs. 79, 80.

Shell umbilicated (*the umbilicus one-fifth the shell's diameter*), depressed, strongly striated, rather thin, subdiaphanous, pale yellowish with a brown dorsal band. Whorls 6.

Alt. 9, greater diam. 16, lesser 15 mill.

Wladiwostock, Siberia, near the Chinese frontier.

H. (*Camæna*?) *græseri* MOUSS., Journ. Conch. 1877, p. 17, t. 1, f. 4.

Allied to *H. pyrrhozona*, but the shell is thinner and more translucent, the striation less rib-like, and the umbilicus wider.

H. PEKINENSIS Deshayes. Pl. 47, figs. 65–70.

Shell widely umbilicated, depressed, subdiscoidal, thin and fragile, whitish horn colored, with a zone of chestnut at the periphery. Surface obliquely regularly costellate, under a lens seen to be most minutely transversely striated; spire very short, slightly convex, the apex obtuse. Whorls 5, narrow, convex, separated by a deep suture, the last cylindrical. Aperture small, ovate-semilunar, oblique, white; peristome thickened, expanded, nearly continuous.

Alt. 6, diam. 11 mill. (*Desh.*)

High Mountains of the prov. Dshyli, west of Pekin, China, at altitudes not less than 1000 meters.

Helix pekinensis Desh., Bull. des Nouv. Arch. du Mus., ix, p. 13, t. 3, f. 13, 14, (1873); *l. c.* x, p. 88, (1874).—*H.* (*Cathaica*) *pekinensis* Mlldff., J. D. M. G. 1884, p. 342.—*Helix* (*Camena*) *tchiliensis* Mlldff., Jahrb. d. m. Ges. 1875, p. 217.

This shell is flatter than *H. pyrrhozona*, with wider umbilicus and more oblique, smaller, aperture. Figures 65–67 represent the *tchiliensis* Mlldff. Fig. 64 is an elevated form, called var. *conoidea* Desh.

H. mongolica Möllendorff. Pl. 47, figs. 71–74.

Shell umbilicated, depressed, obliquely costulate, and *having a crenulated carina*; dull gray-horn; whorls 5, flat above, separated by a superficial suture, the last whorl convex below, but little descending in front. Aperture oblique, broad lunate, with a lip within which appears yellow on the outside; peristome white; outer margin straight above and horizontal, lower margin reflexed, a little thickened within, columellar margin short, dilated, reflexed.

Alt. 7–8, diam. 15 mill. (*Mts.*)

Witschang, northern part of Prov. Petscheli, near the Great Wall under stones, alt. 1500 meters.

H. mongolica Mlldff., J. D. M. G. viii, 1881, p. 39, t. 1, f. 10.—Martens, Centralas. Moll. 1882, p. 13, t. 2, f. 14, 15.—*H.* (*Cathaica*) *mongolica* Mlldff., Jahrb, 1884, p. 342.

This species stands between *H. pekinensis* and *H. plectotropis*.

H. constantinæ H. Adams. Vol. VI, pl. 32, figs. 54, 55.

Shell umbilicated, depressed, thin, obliquely plicate, rufous-brown; spire nearly flat, the apex a little elevated, suture slightly impressed, submargined. Whorls 5½, nearly plane, the last not descending, compressed-carinate, the base convex; umbilicus moderate, profound; aperture oblique, rounded-lunar; peristome expanded, pallid, margins converging, joined by a thin callus. (*Ad*).

Alt. 13, greater diam. 25, lesser 21 mill.

Ichang gorge, China.

H. constantinæ Ad., P Z. S. 1870, p. 378, t. 27, f. 8, 8a.

Evidently allied to the preceding species.

H. MAGNACIANA Heude. Vol. VI, pl. 25, figs. 98, 99.

Shell umbilicated, sublenticular, thin, solid, shining, marked with conspicuous spiral lines; horny-pilose. Spire subelevated, conic; whorls 5, scarcely convex, regularly increasing, the suture superficial; last whorl carinated, not descending, convex beneath. Aperture oblique, lunar, angulated; peristome somewhat thickened, slightly expanded and reflexed; right margin short, straight; basal margin lengthened arcuate, a little dilated at the umbilicus, partly covering it. Umbilicus narrow but perforating.

Alt. 13, greater diam. 20, lesser 17 mill. (*H.*)

Tshin-hsien Mts. in Eastern Sytshuan, China.

H. magnaciana HDE., Fl. Bleu, p. 40, t. 20, f. 13.—*H.* (*Cathaica*) *magnaciana* MLLDFF., Jahrb. 1884, p. 342.

This species may be an *Euhadra*.

H. SEMPRINIANA Heude. Pl. 48, figs. 11, 12, 13.

Shell umbilicated, subplano-convex, tawny, plicate-striate; spire scarcely convex; whorls 4, flattened, joined by a rather wide suture; the last whorl rapidly widening, strongly carinated, slightly descending in front, slightly convex above, obliquely inflated below. Aperture ax-shaped, wide, the peristome subsimple, slightly expanded and reflexed at the root of the columella, the outer margin straight, columella arcuate. Umbilicus very narrow, obliquely perforated.

Alt. of last whorl 6, diam. maj. 13, min. 11 mill. (*H.*)

Southern Hunan.

H. sempriniana H., Moll. Fl. Bleu, p. 43, t. 20, f. 16.

H. INOPINATA Deshayes. Pl. 47, figs. 76, 77, 78.

Shell orbiculate-depressed, subdiscoidal, thin, pale reddish, shining, substriate. Spire very short, obtuse; whorls 7, rather narrow, the first flat, the rest somewhat convex, separated by a simple, depressed suture; the last whorl large, angled at the periphery which is above the middle, the angle marked by a white zonule; convex beneath, deeply umbilicated. Aperture oblique, not deflexed, ovate-semilunar, peristome white, scarcely reflexed above, the base dilated around the umbilicus.

Alt. 14, greater diam. 25, lesser 20 mill. (*Desh.*)

Muping, Prov. Sytshuan, China.

H. inopinata DH., Nouv. Arch. du Mus. vi, p. 21; ix, t. 2, f. 3–5, —PFR., Mon. vii, p. 192, 548.—MTS. Centralas. Moll. p. 19,

(1882).—Ancey, Il Nat. Sicil. 1883, p. 8.—*H.* (*Cathaica*) *inopinata* MLLDFF., Jahrb. 1884, p. 343.

H. BREVISPIRA H. Adams. Pl. 47, fig. 75.

Shell narrowly umbilicated, depressed-orbiculate, very thin, fragile, tawny horn-colored, pellucid, obliquely striated; spire short, the apex obtuse, suture impressed, whorls 5, nearly flat, the last not descending in front, carinated, swollen beneath; aperture lunar, the right and basal margins slightly expanded, columellar margin dilated, reflexed, half covering the umbilicus.

Alt. 11, greater diam. 17, lesser 15 mill. (*Ad.*)

Ichang gorge of the Yangtse River, Prov. Sytshaun, China.

H. brevispira H. AD., P. Z. S. 1870, p. 377, t. 27, f. 6.—PFR., Monogr. vii, p. 458.—*H.* (*Cathaica*) *brevispira* MLLDFF., Jahrb. 1884, p. 343.

H. THIBETICA Deshayes. Pl. 47, figs. 84, 85, 86.

Shell depressed, discoidal, thin, fragile, dirty gray-brown; spire flattened, a little projecting at the apex. Whorls 5, slowly widening, separated by a deep suture; the first whorl smooth, the rest deeply and irregularly plicate, the last whorl having a prominent crenulated angle at the periphery, which is above the middle of the whorl; base plicate, widely and deeply umbilicated; aperture thin, hardly oblique, whitish, lunate-subcircular, the margins disconnected, slightly reflexed.

Alt. 9, greater diam. 19, lesser 16 mill. (*Dh.*)

Muping, Prov. Sytshuan, China.

H. thibetica DH., Nouv. Arch. du Mus. vi, p. 21, (1870); ix, t. 2, f. 8, 9.—PFR. Monogr. vii, p. 457—MTS. Centralas. Moll. p. 20, 1882.—*H.* (*Cathaica*) *tibetica* MLLDFF., Jahrb. 1884, p. 343.

H. BUDDÆ Hilber. Pl. 29, figs. 2–5.

Shell rather broadly and deeply umbilicated, depressed, ground-color brownish, having bluish or white streaks interrupted by two brown bands. Between the raised growth-striæ and over them on the last whorl there are fine, close spiral impressed lines. Spire very low, the apex light brown, moderately convex, whorls 6, separated by deep sutures, the last whorl somewhat deflexed in front strongly convex beneath, but slightly so above. The acute keel has nearly vanished at the aperture, which is elliptical, oblique; the peristome reflexed, whitish, parietal callus very thin.

Alt. 11, greater diam. 21, lesser 18 mill.

Alt. 13, greater diam. 26, lesser 21 mill. (abnormally large specimen.)

Lan-tshu-fu, valley of the Hoangho, Prov. Kansu, and at Yerkalo, on the upper Mekong.

Helix buddæ HILB., Sitz.–Ber. k. Akad. Wiss. Wien. lxxxvi, p. 339, t. 2, f. 8, 9.

Allied to the three following species.

H. PRZEWALSKII Martens. Pl. 48, figs. 16–18; pl. 55, figs. 20, 21, 22.

Shell depressed, openly umbilicated, irregularly striatulate and indistinctly spirally lineate, brownish-gray, variegated with streaks and spots of whitish. Spire hardly projecting; whorls 5½, separated by a rather deep suture, the last whorl a little more convex beneath, slightly subangular at the periphery, rounded at the aperture, and having a yellowish-white thickened streak there (*Mts.*)

Peristome strongly reflexed, the terminations joined by a thin callus (*Hilb.*)

Alt. 11, greater diam. 19, lesser 18 mill. (*Mts.*)

Alt. 13, greater, diam. 21, lesser, 17 mill. (*Hilb.*)

Provinces Gansu, Sytshuan and Yunnan, China.

Helix przewalskii MARTENS, Centralas. Moll., p. 12, t. 2. f. 9, (May 25, 1882).—*H. mencii* HILBER, Sitz.–Ber., p. 341, t. 3, f. 1–3 (Nov. 1882).

Allied to *H. buddæ* but is less depressed, with less acute keel. Von Martens described an immature shell (pl. 48, figs. 16-18). The mature form has been described by Hilber as *H. mencii* (pl. 55, figs. 20–22). A variety described and figured by Hilber differs in having the keel only feebly indicated (pl. 47, figs. 82, 83.)

H. GREDLERI Hilber. Pl. 29, figs. 95, 96, 97.

Shell rather widely umbilicated, depressed; whitish (except the first whorl which is brown), having two sharply defined brown bands. Sculpture consists of distinct riblets, cut by spiral furrows. Spire very low, the apex slightly raised; whorls 5½, slightly convex, separated by deep sutures. Aperture oval, oblique, the upper margin deflexed; peristome whitish, strongly reflexed, having no inner lip; margins of the lip sharp, connected by a thin callus.

Alt. 10, greater diam. 18, lesser 14 mill. (*Hilb.*)

Provinces Gansu and Sytshuan, or Yunnan, China.

Helix gredleri HILB., Sitzungsber., p. 342, t. 3, f. 5 (1882).—*H. stoliczkana* HILB., *l. c.*, 1883, p. 1353, not of Nevill.—H. (*Cathaica*) *gredleri* MLLDFF., Jahrb., 1884, p. 345.

Larger than *H. stoliczkana*, with higher spire.

H. HEUDEI Hilber. Pl. 29, figs. 92, 93, 94.

The shell is widely and deeply umbilicated, moderately depressed, the upper three whorls (in my example) are brownish, the lower three white. Two narrow chestnut-brown bands encircle it. The irregular oblique riblets, as well as their interstices, are finely striated, and reach into the umbilicus; there is besides a fine spiral grooving. Spire moderately raised, the apex flat, whorls 5½. Aperture obliquely oval; peristome reflexed and white.

Alt. 11, greater diam. 17, lesser 14 mill. (*Hilb.*)

Helix (*Fruticocampylaea*) *heudei* Hilb., Sitzungsber. p. 343, t. 3, f. 6.

Resembles *H. pratensis* Pfr. and *H. narzanensis* Kryn., especially the former. The peculiarities of this species are the closeness of its two bands, the strong deflection of the last whorl, and the lack of a lip within.

H. GIRAUDELIANA Heude. Pl. 47, figs. 87, 88, 89.

Shell umbilicated, discoidally compressed, whitish, marked with oblique striæ above, straight beneath. Spire flat, whorls 4½, flat, carinated, separated by a simple suture. Last whorl very convex beneath, not descending. Aperture lunar, peristome simple, slightly reflexed, the outer margin straight; umbilicus moderate, perspective.

Alt. 4, greater diam. 10, lesser 8½ mill. (*H.*)

Yerkalo, on the upper Mekong River.

Helix giraudeliana HDE., Moll. Terr. Fl. Bleu, p. 22, t. 14, f. 12.

More depressed than *H. brevispira* or *H. carimargo*. Has been found only fossil, in the left bank of the Mekong, on the boundary between China and Thibet.

H. ORYTHIA Martens. Pl. 48, figs. 96–99.

A species found fossil in the Löss (Pleistocene) of the Prov. Houan, China. See Martens, Sitz.-ber. Ges. Naturf. Freunde Berlin, May, 1879, p. 73, and Centralas. Moll. p. 12, t. 2. f. 12, 13.

H. SCHENSIENSIS Hilber. Pl. 47, figs. 90–95.

This is also a Löss fossil, probably a variety of the preceding, the locality being Singan-fu, Wei-ho Valley, Prov. Schen-Si, China. See Hilb., *l. c.* p. 333, t. 1, f. 10–13. The types of Hilber's species are in the Royal Hungarian National Museum at Budapest.

H. PULVERATRIX Martens. Pl. 48, figs. 10, 14, 15.

Fossil in the Löss, of the Province Kansu. Closely allied to the following, but differs in greater size, less depressed contour, form of the whorls and the presence of two faint bands. See Martens, *l. c.* p. 16, t. 2, f. 18.

H. PULVERATRICULA Martens. Pl. 48, fig. 5.

Same locality as the last. See *l. c.* p. 17, t. 2, f. 19. *Helix loczyi* Hilber (Sitzungsber. k. Akad. Wiss. Wien, 1882, p. 329, t. 1, f. 4, is believed by Möllendorff to be a synonym. On v. Martens' plate this species is lettered "*H. pulverella.*"

H. KREITNERI Hilber. Pl. 48, figs. 6, 7, 8, 9.

A fossil of the newer Valley Löss, Ku-lang-Shien, Prov. Kansu, China. (See Hilb., *l. c.* p. 330, t. 1. f. 5).

H. SININGFUENSIS Hilber. Pl. 48, figs. 1, 2, 3, 4.

Closely allied to the above, differing in the wider umbilicus and carina at the periphery. Province Kansu. See Hilb., *l. c.* p. 331, t. 1, f. 7.

H. SUBRUGOSA Deshayes. Pl. 57, figs. 11, 12, 13; pl. 48, figs. 19, 20.

Shell umbilicated (the umbilicus one-sixth to one-eighth the diameter of the shell) depressed-globose, solid, opaque; surface dull, rather rugosely striated, yellowish-brown, with a light buff streak outside the lip.

Spire low, apex obtuse; whorls 5–5½, convex, separated by impressed sutures, the last slightly deflexed in front, rounded below, Aperture circular-lunate or oval-lunate, the lip slightly expanded, strongly thickened within, white, the terminations approaching.

Alt. 6, diam. 9 mill. (Dh.)
Alt. 5¾, diam. 8 mill. (Specimen.)
Alt. 5½, diam. 9 mill. (Specimen.)
Alt. 7, diam. 9½ mill. (Mlldff.)

Province of Dshy-li, North China.

Helix subrugosa Dh., Nouv. Arch. du Mus. ix, p. 14, t. 3, f. 25–28 (1873); *l. c.* x, p. 91.—Gredler, Mal. Bl. (n. F.) v, p. 173.—Ancey, Il Nat. Sicil. 1883, p. 5.—*H.(Cathaica) subrugosa* Mlldff., Jahrb. 1884, p. 348, t. 7, f. 6.—*H. kalganensis* Mlldff., Jahrb. ii, 1875, 216.—Pfr. Monogr. vii, p. 588.—*H. buvigneri var. kalganensis* Mlldff., *l. c.* viii, p. 57.—Hilber Sitzungsber., p. 334.

Allied to *H. buvigneri*, but having a half whorl more, and not dilated toward the aperture as that is.

Var. *kalganensis* Mlldff. Differs only in being smaller.

Kalgan, at the Great Wall.

H. lutuosa Deshayes. Pl. 48, figs. 26, 27, 28 (enlarged).

Shell small, narrowly umbilicated, rather solid, whitish, covered with a blackish cuticle; opaque, rather depressed, discoidal; spire very short, apex obtuse. Whorls 5, narrow, convex, separated by a deep suture, slowly increasing, the last whorl a little larger, convex beneath, perforated by a small umbilicus. Aperture white, semilunar, the peristome thickened within, expanded, wider below partly closing the umbilicus.

Alt. 4½, greater diam. 7, lesser 6 mill. (*Desh.*)

Near Peking (after a freshet).

H. lutuosa Dh., Nouv. Arch. x, p. 87; ix, t. 3, f. 18–21.—Mlldff., Jahrb. 1884, p. 350.

H. buvigneri Deshayes. Pl. 48, figs. 24, 25, 21, 22, 23.

Shell narrowly perforated, the opening of the umbilicus of an abnormal ovate form; subglobose, rather depressed, white, opaque, solid, delicately and irregularly striated. Spire short, conoid, the apex obtuse. Whorls 5, narrow, convex, separated by a deep suture, slowly increasing, the last a little larger, convex, slightly deflexed at the aperture and suddenly dilated, produced in a tangent in the umbilicus. Aperture scarcely oblique, subcircular, the ends of the peristome approaching, margins strongly thickened, outwardly expanded, the columellar margin dilated partly covering the umbilicus.

Alt. 7, greater diam. 10, lesser 7 mill. (*Dh.*)

Peking (?), and Provinces Shandung, Honan, Shensi and Gansu, China, living and in Löss.

H. buvigneri Dh., Nouv. Arch. ix, p. 14, t. 3, f. 22–24; x, p. 90.—Mlldff., Jahrb. 1884, p. 350.—Hilber, Sitzungs-Ber. p. 344, t.

2, f. 1, 2.—*H. richthofeni* Mts., Mal. Bl. xxi, p. 68 (1873); Novit. Conch. iv, p. 150, t. 134, f. 11–14; Sitzungs-Ber. Ges. Nat. Fr. Berl. Jan. 1875, p. 3.—Pfr., Monogr. vii, p. 276, 583.

The transversely-inflated contour is characteristic. Figures 21–23 represent the synonymous *H. richthofeni* Mts.

H. confucii Hilber. Pl. 29, figs. 98, 99, 100.

Shell rather narrowly, very deeply umbilicated (the umbilicus slightly covered), depressed-globose, not keeled even when young. Upper three whorls and umbilicus dark horn-brown colored, the following whorls, as far as the base of the last, brownish, with streaks of the color of the earlier whorls; the same color forming a band on the last whorl. Base whitish with brown streaks. Surface having rather coarse ribs, visible to the naked eye, becoming weaker toward the umbilicus. The spire is more or less raised; the 5½ whorls convex, sutures deep. Aperture oval, the peristome very much thickened within, and reflexed at the columellar margin only, so that the umbilicus is partly covered when viewed directly from below; parietal callus quite thin.

Alt. 11–13, diam. 16–18 mill. (*Hilb.*)

Provinces Gansu and Shensi, China.

H. confucii Hilb., *l. c.* 1882, p. 337, t. 2, f. 3–5.

Distinguished by the coarse rib-striation and larger size from the last species.

(*Sinistral species.*)

H. christinæ H. Adams. Pl. 57, figs. 15, 16, 17.

Shell *sinistral, openly, perspectively umbilicated (the umbilicus contained about three and a half times in the diameter of the shell)*; depressed, discoidal, rather thin. Surface marked with fine growth lines. Whitish, distinctly radially banded and more or less suffused with brown above, having a narrow white band above and a wide brown band below the peripheral keel, *the base having several obscure spiral bands*, and radiately streaked with corneous-brown; interior of umbilicus brown.

Spire almost flat; whorls 5¾; apex brown, a trifle projecting, the inner whorls rather flat; *last 1½ whorls decidedly convex and swollen above, obtusely angular above the middle, the angle disappearing on the latter part of the body-whorl;* deflexed a little at the aperture.

Aperture lunate, oblique; peristome slightly thickened within, very slightly expanded below and at columella, the upper, outer and columellar margins strongly arcuate, basal margin less curved, *outer margin not angled.*

Alt. 7, diam. 19 mill., sometimes larger.

Provinces Sytshuan and Shensi, China.

H. christinæ H. Ad., P. Z. S. 1870, p. 377, t. 27, f. 4, 4a.—Heude, Moll. Terr. Fl. Bleu, p. 111, t. 29, f. 6.—*H. subchristinæ* Ancey, Le Naturaliste 1882, p. 44; Bull. Soc. Mal. Fr. 1885, p. 114.

The spire is less depressed than in *filippina*, more depressed than in *subsimilis*, to both of which it is nearly allied. The *H. subchristinæ* of Ancey seems to me identical with the typical *christinæ*.

Var. subsimilis Desh. Pl. 49, figs. 29, 30, 31, 32, 33.

Spire convex; whorls 6–6½, the last less swollen above than in the type, and somewhat more acutely angled at the periphery, the angle disappearing on the latter third of the body-whorl. Coloration as in the type, except that *the base is milk-white, with some bluish radiating streaks. Umbilicus deep, one-fifth the diameter of the shell,* more cylindrical than in the type.

Alt. 9, diam. 20 mill.

Alt. 12, diam. 25½ mill.

Provinces Sytshuan and Shensi, China.

H. subsimilis Desh., Nouv. Arch. du Mus., Bull. ix, p. 10, t. 2, f. 28, 29.—Heude, Moll. Terr. Fl. Bleu, p. 22, t. 20, f. 18.—*H.* (*Zonites?*) *subsimilis* Hilber, Sitzungs-Ber. p. 338, t. 2, f. 6, 7.—? *H. christinæ var. carinifera* H. Ad., P. Z. S. 1870, p. 377.—*Cf.* Mlldff. Jahrb. 1884, p. 351, Ancey, Nat. Sicil. 1883, and Gredler Arch. f. Naturg. vol. 50, p. 263.

The varietal name given by H. Adams is not sufficiently well defined to permit positive identification.

H. filippina Heude. Pl. 49, figs. 34, 35.

Shell resembling *H. christinæ*, *but having the spire completely flat*, whorls 5½, almost plane above, the suture superficial, submargined above; last half of the last whorl descending slightly below the carina, becoming convex above; *very acutely keeled*, the keel continuing to the outer lip, which is rendered angular by it. Umbi-

licus very broad and open, one-fourth the diameter of the shell. Surface finely striated, streaked with white and horny-brown above and below, with a brown zone below the carina.

Alt. 6, diam. 18–19 mill.

Batung (Patong) Mts., Prov. Hubei, China.

H. filippina Hde., Moll. Terr. Fl. Bleu, p. 23, t. 20, f. 19.

Decidedly flatter above, and more acutely keeled than *H. christinæ*.

H. dejeana Hende. Pl. 49, figs. 36, 37, 38.

Shell umbilicated, sinistral, buff-greenish, covered with confused spiral striæ; spire convex, but much depressed. Whorls 4, regularly increasing, separated by a narrow, little impressed suture, the last whorl conspicuously carinated, the carina channelled above; aperture oblique, sinuous, a little descending; umbilicus ample, perspective.

Alt. 5½, greater diam. 10, lesser 9 mill. (*H.*)

Ta-tsien-lu, on the Ya-lung River, Province of Sytshuan, China.

H. dejeana Hde., *l. c.* p. 21, t. 20, f. 17.

The peristome may not be fully formed in the specimens described and figured.

Helix anceyi (v. Moll.) Ancey, Le Naturaliste 1889, p. 205, China. A setose, sinistral, umbilicated species, comparable according to Ancey to *submissa* Dh. and *dejeaniana* Heude. *Unfigured.*

Section Eulota Hartm.

=*Eulota* Hartm. plus *Dorcasia* (oriental species) auct., and *Acusta* Alb. *cf.* v. Mlldff. Nachr.-Bl. d. m. Ges. 1892, p. 87–90.

This group attains a great development in East Asia, being numerously represented from Siberia to the East Indies, the limits of its southward extension being still unknown. It is excessively difficult to draw the line between the shells of *Eulota* and those of the sections of *Chloritis* which the writer has called *Trichochloritis* and *Austrochloritis;* but no such difficulty exists when the soft parts give their testimony; for *Chloritis* differs profoundly from *Eulota* in the genital organs. In a previous volume, the presence of hairs or hair-scars *arranged in regular series upon the apical whorls*, has been taken as diagnostic of *Chloritis*, whilst the irregular-

ity of hairs or their total absence upon the apex has been considered a character of *Eulota*. Until some other criterion for the discrimination of the genera is shown to be available, I prefer to adhere to this arrangement, being of the opinion that its abandonment would cause more confusion than its retention.

H. KIANGSINENSIS Martens. Pl. 55, figs. 18, 19.

In Vol. III, p. 209, Tryon has included this form as a synonym of *H. maackii* var. *unizonalis* H. Ad.; but while the identity with Adams form is probable, *kiangsinensis* is very distinct from *H. maackii* and its variety *depressior* Pfr. (*conrauxiana* Heude) in lacking the prominent costulation of those forms. One of Martens' original figures of *kiangsinensis* is given in Vol. III, pl. 48, fig. 67. This figure represents a small form. The figures on pl. 55, represent well-grown specimens. The aperture in these large forms is subcircular, lip expanded, reflexed below and at the columella. The basal lip is remarkably arcuate. Specimens before me measure 38 mill. greatest diameter, and they are known even larger.

Central China.

H. maackii var. unizonalis H. Ad., P. Z. S. 1870, p. 793.—*H. kiangsinensis* Mts. Sitz.-Ber. Ges. Nat. Fr.-Berlin, Jan. 1875, p. 2; Mal. Bl. xxii, p. 186; Novit. Conch. iv, p. 151, t. 134, f. 15–17.—Pfr. Monogr. vii, p. 407, 587.—Gredler, Nachr. Bl. 1878, p. 102; Mal. Bl. (n. f.) i, p. 173.—Heude, Moll. Terr. Fl. Bl. 1882, p. 5, t. 14, f. 1.—Hilber, Sitz.-Ber. 1882, p. 344, t. 3, f. 7.—Ancey. Nat. Sicil. 1883, p. 4.—Gredler, Jahrb. 1884, p. 136, (varieties) p. 359.

Var. *major* Mlldff. Larger than the original Martensian examples; base more convex, and aperture rounded.

Var. *cerasina* Gredler. Nearly unicolored cherry-red.

The specific name *unizonalis* Ad. should not be used because of the insufficiency of Adams' description.

H. DUPLOCINCTA Martens. Pl. 49, figs. 39–42.

Shell conic-globose, perforated, striatulate, and distinctly spirally lineate, sometimes malleated, pale grayish-yellowish, with a median whitish zone, bordered on each side with brown; rarely unicolored. Whorls 6, slightly convex, spire short-conoid, apex obtuse, pale; the last whorl inflated, very distinctly deflexed in front. Aperture little oblique, suborbicular; peristome a trifle expanded, white-

lipped within, the basal margin deeply arcuate, columellar margin short, dilated, reflexed, white, half covering the perforation.

Alt. 19–23, diam. 22–25 mill. (*Mts.*)

Kuldsha, Pilutschi and Kosch; Valley of the Ili River and its affluent the Kungess, in Tianshan, *Central Asia.*

Helix duplicincta Mts., Sitzungsberichte d. Gesellsch. Naturf. Freunde in Berlin, Oct. 1879, p. 125; Mém. l'Acad. Imp. Sci. de St. Pétersb., (7), xxx, no. 11, p. 4, t. 1, f. 1–7 (shells); t. 5, f. 1–7 (genitalia, jaw and teeth).

H. PARICINCTA Martens. Pl. 49, figs. 43–50.

Shell subdepressed-globose, perforate, and striatulate, having very fine close spiral lines, visible only under the lens, and occasionally also malleated in places. Pale yellowish, with 2–4 brown bands, rarely wanting. Whorls 6, slightly convex; spire conoid, apex obtuse, yellowish; the last whorl rounded, deflexed in front. Aperture rather oblique, lunate-orbicular, peristome obtuse, slightly expanded, half covering the perforation.

Alt. 16½–17½, diam. 20½–22½ mill. (*Mts.*)

Valley of the River Ili and its affluents; River Kungess, at about 1300 *meters alt.*

Helix paricincta Mts. Sitzungsberichte, etc., p. 125; Mém de l'Acad. St.-Pét. p. 5, t. 1, f. 8–13 (shells); t. 5, f. 8, 9 (jaw and teeth).

Var. *bisbicincta* Mts. Whitish, bands 4 (or 3), two above, two below, the intermediate sometimes confluent; formula (1, 2) 3, 4, 5, (figs. 43, 47–49).

Var. *ambicincta* Mts. Yellowish, bands 2, one sutural, another basal; formula (1, 2,) – – 5. Last whorl much malleated (fig. 44).

Var. *incincta* Mts. Whitish, without bands; last whorl strongly malleated (fig. 45).

Var. *bilaticincta* Mts. Smaller, elevated, whitish, with 2 (or 1) wide bands, one above, one below; formula (1, 2, 3) (4, 5); sometimes joined, formula (1, 2, 3, 4, 5); aperture shorter (figs. 46, 50).

Alt. 15, diam. 17 mill.

H. FRANCISCANORUM Gredler. Pl. 54, figs. 97, 98, 99.

Shell depressed, spire convex, apex obtuse; umbilicus moderately open. Distantly and unequally striated, very densely granulose, shining, thin, pellucid, chestnut-brown. Whorls 5¾–6, a little con-

vex, sensibly increasing, the last dilated, shortly descending in front; suture deep. Aperture large (10 mill.), sublunar, oblique, liver-violet colored; peristome thin, very narrowly expanded (more widely below), the margins separated, basal margin subsinuous.

Alt. 12, diam. 22 mill. (*Gred.*)

Pe-shang, southern Hunan, China.

Helix franciscanorum GREDLER, Mal. Blätter, ix, p. 2, (1886); Annalen des K. K. Naturalist. Hofmus. ii, p. 284, t. 11, f. 7–9 (1887).

Var. *minor*, 9x18 mill.; umbilicus slightly narrower; whorls 5½, the upper subangular around the suture.

H. EXTRUSA Tapparone-Canefri. Pl. 54, fig. 100.

Under this name Canefri separates the form figured in the Conchologia Indica, pl. 53, fig. 2, as *Helix similaris var.* It is intermediate between *H. similaris* and *H. bolus*, agreeing with the former in the structure of the shell, and with the latter in the form of the aperture.

Katha, upper Irawaddy.

Helix (*Dorcasia*) *extrusa* T. C., Ann. Mus. Civ. Genov. (2), vii, p. 326, 1889–1890.

C. BALANSAI Morlet. Pl. 54, figs. 4, 5, 6.

Shell narrowly umbilicated, subglobose-depressed, thin, entirely white, convex beneath; radially striated, covered with a thin hispid epidermis (the hairs short, close, arranged in quincunx). Spire subdepressed; whorls 5½, slightly convex, separated by a simple suture, the last whorl slightly descending. Aperture oblique, semilunar, white inside, the margins joined by a thin transparent callus; basal margin arcuate, the columella short, expanded, partly covering the umbilicus; peristome bluish-white, thick, outwardly reflexed. (*Morl.*)

Alt. 15, diam. 27 mill.

Bay of Malong and Mount of the Elephant, Tonquin (Jourdy).

Helix balansai MORLET, Diagn. de Moll. terr. et. fluv. du Tonkin, p. 1, July 23, 1886; Journ. de Conch. 1886, p. 270, t. 12, f. 4, 4a.

A variety (fig. 5) has a brown band at the periphery and a chestnut-brown lip. Morlet compares the species with *H. propinqua* Pfr., a smaller species with higher spire, wider umbilicus and rounder aperture.

H. JOURDYI Morlet. Pl. 54, figs. 1, 2, 3.

Shell moderately globulose, thin, translucid, pale yellow; having very irregular, transversely oblique rib-like striæ. Spire subconoid, the apex obtuse; whorls 6, convex, the first smooth, the last subangular at the periphery, the angle disappearing on the last third of the whorl. Aperture half round, the margins not continuous, connected by a very thin, shining but inconspicuous deposit of callus; peristome thick, white and reflexed, the columellar margin widening at its insertion, partly covering the umbilicus. Interior of the aperture white, its transparence permitting the striæ of the exterior to be seen. (*Morl*).

Alt. 15, diam. 21 mill.

Around Lang-son, Dang-son and Chee, Tonquin; very common, (Jourdy).

Helix jourdyi MORL., Journ. de Conch. xxxiv, p. 75, 269, t. 12, f. 3, 3a (1886).

A var. *minor* (fig. 1) is smaller, alt. 13, diam. 17 mill., and more strongly angular at the periphery.

This species resembles *H. bocageana* Crosse, but it is smaller, less globose and unicolored, with pure white, thick lip. The spire is less elevated and the umbilicus larger than in *H. mabillei* Crosse.

H. SUFFODIENS Boettger. Pl. 54, figs. 94, 95, 96.

Allied to *H. fodiens* and *H. carinifera*, but differing in having the umbilicus wider, whorls more slowly increasing, aperture smaller, the columella more perpendicular.

Shell moderately umbilicated, the umbilicus deep, $\frac{1}{6}$–$\frac{1}{7}$ the width of the shell; conoid-globose, thin, diaphanous, pale buff-horn colored, having an oily sheen. Spire rather elevated, conic, the sides slightly convex; apex somewhat acute. Whorls 5, slowly increasing, a little convex, separated by an impressed suture, subfasciculately striatulate and all over minutely but very distinctly irregularly granulated; the last whorl distinctly angulated at the periphery the angle disappearing toward the aperture; subangulated around the umbilicus, slowly descending at the aperture. Aperture a little oblique, truncate-circular, subangled below; peristome simple, acute, slightly expanded, hardly paler than the shell, the columella concave but perpendicular, columellar margin triangularly dilated, protracted, subreflexed. (*Bttg.*)

Alt. $10\frac{1}{2}$, diam. $13\frac{1}{2}$ mill.; apert. alt. 7, width $7\frac{1}{4}$ mill.

Gorontalo, in Menado, northern Celebes.

Helix (Doreasia) suffodiens Bttg., Bericht. Senck. Naturf. Gesell. 1891, p. 267, t. 3, f. 10.

This was taken for *H. fodiens* by Wallace (P. Z. S. 1865, p. 498), and was not found by Martens. It differs from all related species in the fine granulation and in the umbilicus which is nearly twice as wide. (*Bttg.*)

H. DISSIMILIS Semper. Pl. 51, figs. 42, 43.

Shell most narrowly umbilicated, globose-depressed, rather thin, subdiaphanous, flesh colored; ornamented with very minute tubercles, and obliquely rugose-striated. Whorls 5½, slowly increasing, subconvex, the last subcarinated and at the peristome constricted. Umbilicus very narrow, half covered. Aperture lunar, buff-flesh colored inside; peristome acute, reflexed, whitish within, the columellar margin reflexed, half covering the umbilicus. (*Semp.*)

Alt. 10, greater diam. 15, lesser 13 mill.

Aparri, Province of Cagayan, Luzon, Philippines.

Chlorœa dissimilis Semp., Reisen, p. 233, t. 10, f. 8.

This species is well characterized by the coarse granulation and the strong constriction behind the lip, as well as by the narrow umbilicus. Animal not examined.

H. CARINIFERA Semper. Pl. 51, figs. 29, 30.

Shell umbilicated, globose-depressed, rather thin, diaphanous, buff-flesh colored; obliquely and closely striated, very minutely and densely punctate. Whorls 4½, slightly convex, the last subcarinated, compressed around the umbilicus. Umbilicus narrow, pervious. Aperture lunate rounded, flesh colored inside; the peristome is subreflexed, whitish, the columellar margin reflexed. (*Semp.*)

Alt. 12, greater diam. 17, lesser 15 mill.

S. Nicolas, N. Ecija, Luzon: Benguet, Luzon, Philippines, at 4000 feet alt.

Chlorœa carinifera Semper, Reisen, p. 233, t. 10, f. 1 (1880).

The peripheral keel is much stronger and the spiral striæ far fewer than in *H. fodiens*. It differs from all other species in the extremely dense minute punctation, visible only under a lens, which is entirely lacking in *H. fodiens*.

H. TENIMBERICA v. Möllendorff. Pl. 58, figs. 12, 13.

Shell rather openly and perspectively umbilicated, convex-depressed, thin, transversely finely plicate-striated, and decussated

by spiral lines; shining, buff-horn colored. Spire very sharply conoid, the apex dat, shining. Whorls 4, slightly convex, regularly increasing, separated by a rather impressed suture, the last whorl obtusely angulated above the periphery, convex beneath, roundly angled and somewhat swollen around the umbilicus. Aperture little oblique, somewhat rounded-ax-shaped: peristome thin, very narrowly expanded, the columellar margin is dilated above, and forms a distinct angle with the basal lip.

Alt. 11·5, diam. 20 mill.; aperture width 11·5, long. 9·5, alt. 9 mill. (*Mlldff.*)

Tenimber Is.

Eulota tenimberica MLLDFF., N. D. M. G. 1892, p. 91, t. 1, f. 3.

Remarkable for the semi-translucent, thin shell, with an oily luster, reminding one of *Macrochlamys*. The spiral sculpture, peripheral angle, the form of the umbilicus and the angle at the foot of the columella, show it to belong to the group of *H. similaris*.

H. BITÆNIATA Möllendorff. Pl. 58, figs. 18, 19.

Shell broadly umbilicated for Eulota, subglobose, transversely striatulate, decussated by extremely close, very delicate spiral lines; opaque, whitish, ornamented with two rather wide brown bands. Spire convex-conoid, the apex obtuse, glabrous, rufous-brown above, as far as the fourth whorl. Whorls 4½, slightly convex, the last subacutely carinated at the periphery, convex beneath, and very shortly descending in front. Aperture very oblique, truncate-oval: peristome little expanded, somewhat white lipped, the columellar margin dilated, reflexed.

Alt. 10, diam. 13·5 mill., aperture width 7·75, long. 7, alt 6·25 mill. (*Mlldff.*)

Tenimber Is.

Eulota bitæniata MLLDFF., N. D. M. G. 1892, p. 91, t. 1, f. 7.

The surface of fresh specimens is dull, and the color is not pure white, but passing into yellowish.

H. GONIOSTOMA Möllendorff. Vol. IX, pl. 15. figs. 4, 5.

Shell narrowly but perspectively umbilicated, conoid-globose, rather solid, transversely striatulate, very minutely granulated; grayish-white or corneous-brown, rarely reddish. Spire more or less conically elevated, the apex rounded. Whorls 5, convex, slowly increasing, separated by a rather deep suture, the last laterally

compressed, angulated at the suture, having at the periphery an obtuse, more or less exserted carina, extending to the peristome; shortly descending in front. Aperture quite diagonal, rounded-tetragonal, little incised by the penultimate whorl; peristome expanded, hardly reflexed, thickened, white-lipped, the margins joined by a rather thick callus.

Alt. 10·5–13·5, diam. 14–15·5 mill. (*Mlldff.*)

Tenimber Is.

Eulota (*Plecteulota*) *goniostoma* Mlldff., N. D. M. G. 1892, p. 92, t. 1, f. 4.

Var. *major*. Shell larger, rufous, whorls less convex, the umbilicus narrower, aperture liver colored within. Alt. 12, diam. 16·5–17 mill. (*Mlldff.*)

This seems nearest to the Australian forms *duralensis* Cox, *pliculosa* Pfr., and also *E. occulta* of the Aru Is. It is rather variable in color, altitude of spire and prominence of the carina. The keel is never entirely lacking, but is often only a rounded, weak cord, which in extreme forms (forma *carinata*) becomes strongly projecting, and is continued to the aperture.

H. telitecta Möllendorff. Pl. 58, figs. 14, 15.

Shell narrowly but perspectively umbilicated, depressed, solid, having delicate, curved plicate-striatulate sculpture, the cuticle very thin, deciduous, seen under a strong lens to be densely punctate and covered with microscopic hairs; having a frosty appearance, opaque, buff-horn colored. Spire depressed-conoid. Whorls 4½, slightly convex, slowly increasing, separated by an appressed, margined suture, the last whorl begirt at the periphery with an obtuse but distinctly projecting carina; subinflated below, roundly angled around the umbilicus, shortly deflexed at the aperture, coarctate. Aperture diagonal, truncate-elliptical, the peristome broadly expanded, everywhere reflexed, rather thick, rose-lipped, the margins a little converging, joined by a distinct callus, columellar margin strongly dilated above, partly covering the umbilicus.

Alt. 9·8–11·25, diam. 16·5–19 mill.; aperture width 10·5, long. 8–9·5, alt. 5–6·5 mill. (*Mlldff.*)

Tenimber Is.

Eulota (*Plecteulota*) *telitecta* Mlldff., N. D. M. G. 1892, p. 93, t. 1, f. 6.

Despite the *Chloritis*-like aspect of this novelty, its nearest relative is not a *Chloritis*, but the *H. cryptopila* Mouss., from the island Rakata, in Sunda Sts., and of Java (Pfr. Novit. Conch. iv, p. 40, t. 117, f. 10–12); but this is much lighter (grayish horn-colored), more acutely keeled, the keel continued to the aperture, causing the latter to be angular; the peristome is much less widely expanded, hardly reflexed, and not so strongly thickened as in our species, in which it is moreover of a rose-red color. The granulation (punctation) is much finer in *telitecta*, the pilosity visible only under strong magnification. The sudden contraction of the whorl behind the aperture is also a peculiar feature of this new form. (*Mlldff.*)

Unfigured species.

Dorcasia schadenbergi v. Mlldff., Nachr.-Bl. 1888, p. 144. "Tetas de Santa" Mts., Prov. Ilocos.

Eulota hemispherica Mlldff., Nachr.-Bl. D. M. G. 1892, p. 90. Tenimber Is.

H. OENOSTOMA Deshayes. Vol. V, Pl. 14, figs. 81–83.

Subglobose, rather depressed, yellow, ornamented with whitish lines, periphery encircled by a brown band; spire short, conoidal, apex obtuse; whorls 5, rather narrow, subplanulate, longitudinally striate, the last convex, depressed, base perforated; aperture oblique, ovate lunar; peristome reflexed, thin, acute, rubescent within; basal margin dilated, partly covering the perforation.

Alt. 16, diam. 24 mill. (*Desh.*)

Habitat unknown.

H. oenostoma DESH., in Fér. *Hist.*, i, p. 204, t. 95, f. 5.—PFR. Monogr. iii, p. 221, v. p. 337.

A species known only by the original figure and description. I know nothing of its systematic position.

Section EUHADRA Pilsbry, (Vol. VI, p. 95).

H. MASSIEI Morlet. Pl. 29, figs. 90, 91.

Shell widely and deeply umbilicated, globose-conoid, quite solid, sculptured with radiating, unequal rib-like striæ and narrow spiral grooves, sometimes somewhat malleated. Color variable; buff with encircling chestnut lines, or buff-reddish. Spire obtuse; whorls 6½, separated by a linear, little impressed suture, slightly convex,

the last whorl convex, not descending in front, convex beneath, encircled at the periphery with a chestnut or whitish zone. Aperture ovate-lunar, the margin joined by a very thin callus; columella short, outwardly dilated at the umbilicus; basal margin arcuate, lip reflexed, rounded, white or violaceous.

Alt. 28, greater diam. 39, lesser 31 mill. (*Morlet.*)

Song-ma, Tonquin.

Helix massiei MORL., Journ. de Conch., xxxi, 1891, p. 26, 244, 247, t. 5, f. 2.

H. PANCALA Schmacker & Boettger. Pl. 29, figs. 85, 86, 87.

Shell sinistral, perforated, conoid-globulose, rather solid, straw-colored or tawny-yellowish, with two brown bands; perforation sometimes brown; shining. Spire moderately raised, convex-conic, the apex rather acute. Whorls 6, very slowly increasing, rather convex, separated by an impressed suture, subregularly obliquely striated, and decussated by irregular, indistinct, impressed spiral lines; the last whorl subcylindrical, slightly enlarged at the aperture, not descending, a little more than one-half the altitude of the shell. Aperture diagonal, transversely elliptical, slightly lunate; peristome expanded, a little reflexed; throat whitish with two black bands; margins of peristome white-lipped, widely separated, joined by a very thin sigmoid callus, the upper and left margins regularly curved, basal elongated, straightened somewhat, columella shortly ascending, vaulting, reflexed over and half covering the umbilicus. (*S. & B.*)

Alt. 20½, greater diam. 25½, lesser 22½ mill.

Alt. 14–23, greater diam. 20–27, lesser 17–24 mill.

South Cape of Formosa, on the Mts.

H. bacca var. sinistrorsa MLLDFF., Jahrb. D. M. Ges. xi, 1881, p. 387 (*not H. bacca* Pfr. nor *H. sinistrorsa* Charp. or Desh.)—*H. Hadra pancala* SCHM. & BTTG., Nachr.-Bl. 1891, p. 161, t. 1, f. 6, 6*a*, 6*b*.

The typical form lives in the mountains on trees. Most individuals have two dark bands, but in some the space between the bands is darker than the rest of the shell, chestnut-brown; and the rest of the shell then is of a darker tone than usual. In a few specimens the upper band is lacking, and finally there are also examples with two distinct bands and one obsolete upper band, and the perforation

is sometimes colored brown. This species differs from *H. formosensis* in being more solid, more globose, much more narrowly umbilicated, the spire higher and more conic, etc.

Var. *trifasciata* Schmacker & Boettger. Shell smaller, more depressed, thinner; color frequently darker, yellowish-tawny, always trifasciate; the aperture less distinctly lipped.

Alt. 15, greater diam. 22, lesser 19 mill. (*S. & B.*)

Plain, at the foot of the Mts.

This species belongs to a group of Helices containing *H. bacca*, *batanica* and *formosensis*. They seem more closely allied to the group of *H. succincta* than to any other.

Section LYSINOE Ads. (Vol. IV, p. 69.)

H. COLORADOENSIS Stearns. Pl. 56, figs. 1, 2, 3.

Shell orbicular, moderately depressed, spire slightly elevated, apex obtuse, number of whorls four to four-and-a-half, rounded. Umbilicus narrow, showing the penultimate whorl, though partially covered by the reflection of the lip at the point of junction with the base of the shell. Aperture obliquely ovate, nearly circular, and almost as broad as high. Lip slightly thickened and reflected, or simple, varying in this respect; more reflected and aperture more effuse at the columella. Parietal wall in the heavier examples calloused, the callus connecting with the inner edges of the outer lip above and below. Shell rather fragile, thin, translucent; surface smooth and shiny, and sculptured with fine incremental lines. Color pale horn to white, and otherwise marked by a single narrow revolving reddish-brown band just above the periphery, which in some specimens is obscure or absent. In some individuals certain faint scars upon the upper whorls imply an occasionally hirsute character. (*Stearns.*)

Alt. 10¼, greatest diam. 15¼, least 13¼ mill. (largest spec.)

Alt. 8¾, greatest diam. 13¾, least 12 mill. (smallest adult.)

Grand Canon of the Colorado, opposite the Kaibab plateau, at an elevation of 3,500 feet.

Helix (Arionta) coloradoensis STEARNS, Proc. U. S. Nat. Mus. 1890, p. 206, t. 15, f. 6, 8, 12.

The above, while exhibiting a facies or aspect of its own, is nevertheless suggestive of *H. remondi* Gabb, Mazatlan, in the Mexican State of Sinaloa, and also from the high mesas or table-lands in the

neighborhood of Mulege, Lower California. *H. carpenteri* Newcomb, which is a synonym of *H. remondi*, is credited by the author to "Tulare Valley," and has been found in other localities in California. A glance at the map will show how widely separated geographically *H. coloradoensis* is from its nearest allies, and this discovery of Dr. Merriam's extends the distribution of the west coast type of *Helices* farther to the eastward than heretofore, and adds an area of great extent to that previously known. (*Stearns.*)

Figures 7 and 12 of Stearns' plate were transposed.

H. MAGDALENENSIS Stearns. Pl. 56, figs. 4, 5, 6.

Shell orbicular, much depressed, apex whorls but very slightly elevated, suture well defined. Whorls three and a half to four, flattened above, slightly obtusely angulated on the periphery, and rounded below. Umbilicus open, showing the whorls; upper line of the mouth more or less slanted downward where it joins the body whorl, varying in this character in different specimens. Aperture broader than high, ovate, somewhat oblique, slightly effuse, and thickened and reflected a little at the edge, more so in the umbilical region, where it partially overhangs the umbilicus. In some examples a thin deposit of callus on the parietal wall suggests a continuous peristome. Surface sculptured by the ordinary lines of growth, which vary in prominence in different individuals. Color, dingy whitish, the specimens, *nine* in number, being dead, with an obscure, narrow, reddish-brown band just above the periphery. (*Stearns.*)

Alt. 6½, greater diam. 13, lesser 10 mill. (largest spec.)

Alt. 5½, greater diam. 10½, lesser 9 mill. (smallest adult.)

Magdalena, State of Sonora, Mexico, on the line of the Sonora, New Mexico and Arizona Railroad, which terminates on the Gulf of California at Guaymas; among rocks on the top of a mountain at an elevation of 1,000 feet above the town.

Helix (*Arionta*) *magdalenensis* STEARNS, Proc. U. S. Nat. Mus. xiii, 1890, p. 207, t. 15, f. 11, 13, 7.

This species in its principal features, indicates a relationship with its geographical congener, *H. rowelli*, Newcomb, which has been found in the Salt River Mountains, 7 miles north of Phœnix, Arizona (Pilsbry). *H. lohri* Gabb, which is regarded as a synonym of *rowelli*, collected by its author on the table-lands of Lower California near Mulege, and it has also been credited to Chihuahua, Mexico, and farther eastward to "Texas," upon what authority I am

not aware. The relationship of *H. magdalenensis* to *rowelli* is like that of the Californian snails *H. exarata* to *H. arrosa*, of the small forms of *H. fidelis* to *H. mormonum*, or of *H. stearnsiana* to *H. kellettii*, etc. Its dimensions are in every way less than those of *rowelli* +*lohri*. (*Stearns.*)

Section CAMPYLÆA Beck, (Vol. IV, p. 83.)

H. TIESENHAUSENI Gredler. Pl. 25, figs. 7, 8, 9.

Allied to *H. planospira*, but differs in having a rather smaller shell, *thin, shining, greenish-hyaline, without band*; whorls of the spire less convex; last whorl not inflated, lower, less descending in front. Aperture much less oblique and rounded; peristome less expanded, the lower margin less reflexed.

Alt. 11–12, diam. 26 mill.

Mts. between the Eisack and the Avisio.

H. tiesenhauseni GREDL., Nachr.-Bl. D. M. Ges. xxi, 1889, p. 195.—KOBELT, Rossm. Icon. n. f. v, p. 77, f. 885.

This is a local race of *H. planospira*, produced by the lack of lime in the soil; but its characters are so strongly marked that a name is necessary for it.

H. NICOLISIANA Adami. Pl. 25, figs. 13, 14, 15.

Shell perspectively umbilicate, depressed, rather solid, but not thick; delicately irregularly striated, peculiarly corrugated at the suture; under a strong lens seen to be spirally, very finely lineolate with short impressed lines; whitish or greenish-white, ornamented with narrow brown bands above the middle; spire nearly flat, the apex small, horny, but slightly projecting; whorls 6, a little convex, separated by a impressed suture, the upper slowly and regularly increasing, the last whorl large, dilated, compressed, rotund or very obsoletely subangulate; base somewhat flattened, subangulate around the umbilicus, vertically passing into it; shortly deflexed in front; aperture very oblique, ovate, rotund, little lunate, brownish within, showing the bands; peristome shortly reflected, white lipped, the margins converging, joined by a very thin callus; columellar margin slightly dilated at the insertion. (*Kob.*)

Alt. 10, greater diam. 23, lesser 20 mill.

Province of Verona, on Monte Zerola and Monte tre Croci, 2,000 meters alt.

H. nicolisiana Ad., Bull. Soc. Mal. Ital. 1885, p. 114.—Kobelt, Rossm. Icon. n. f. v, p. 78, f. 886.

Stands in the same relation to *H. hermesiana* that *H. preslii* does to *cingulata* Stud. It much resembles *H. preslii.*

H. foetens (Vol. IV, p. 93), var. millieri Bourguignat. Pl. 25, figs. 20, 21, 22.

Shell much depressed, umbilicated, the umbilicus deep and rather open, its width contained 6½–7 times in the shell's diameter. Thin. Surface shining, the growth-lines uneven, rather strong. Color greenish-corneous, tinged with whitish around the umbilicus and having a narrow distinct chestnut-brown band above the periphery, margined below by a very indistinct light zone.

Spire very low, nearly flat; apex rather large, obtuse; whorls 4¾, those of the spire slowly increasing, the last whorl much wider, *double the width of the preceding,* descending in front. Aperture very oblique, transversely oval, but little lunate; peristome white-edged inside and out, the upper margin hardly expanded, having a thin brown lip within, and a brown streak behind it outside; outer lip expanded, basal lip narrowly reflexed, white, the white columellar lip dilated; terminations of lip approaching, joined by an imperceptible callus.

Alt. 9, diam. 19 mill.

Saint-Martin-de-Lantosque, Maritime Alps, France, 4,000–6,000 ft. alt., under mossy stones in the pine forests (Hedley).

Helix millieri Bourguignat, Description de quelques espèces nouvelles de mollusques terrestres et fluviatiles des environs de Saint-Martin-de-Lantosque, Alpes-Maritimes, p. 5. (Cannes, 1880).

This species, says Bourguignat, has its analogues in the high Alps of Lombardy, at Monte Gleno 2,700 meters, Pizzo Tornello, 2,600, meters, Monte Codena 2,500 meters; but these are all undescribed. It resembles *H. debetta* Adami, but differs in its more open umbilicus, more angular periphery, more rapidly increasing whorls, more exactly oblong aperture, the more approaching margins, etc.

Typical specimens from the original locality are before me, collected by Charles Hedley. It is merely a mountain form of *H. foetens,* with no differential characters worth mentioning.

H. subzonata Mouss. var. depressa Bttg. Pl. 31, figs. 46, 47.

Differs from the type in the more depressed form, wider umbilicus showing all the whorls, the paler color, wide rufous band and

persistent hairs over the entire surface; the suture is narrowly but distinctly marked with white.

Alt. 14½, greater diam. 27, lesser 22 mill. (*Kob.* in Rossm., n. f. v, p. 110, f. 952).

Perithea, northeast Euboea, Greece.

H. CONEMENOSI Boettger. Pl. 25, figs. 1, 2, 3; pl. 31, figs. 52, 53.

Shell depressed-globose, umbilicated, solid, green-straw-yellow with a rather narrow chestnut-brown band above the periphery. Surface obliquely striatulate, and showing under a strong lens, obsolete, dense, spiral striation. Spire convex. Whorls 5½, the earlier slowly, the last very rapidly widening, rather inflated, deeply descending in front. Aperture very oblique, oval; peristome white, somewhat thickened within, outer margin expanded, basal margin reflexed, columellar margin much dilated, partly concealing the umbilicus, which is about one-eleventh the diameter of the shell.

Alt. 18, diam. 31 mill.

Santameri, Achaia, Greece.

H. conemenosi BTTG., Nachr. D. M. Ges. xvii, p. 120, 1885.—KOBELT, Rossm. Icon. n. f. v, p. 108, f. 945, 946.—*H. conemenosi var. acarnanica* KOB., l. c. p. 109, f. 947.

Figures 1–3 are drawn from a specimen received from Conemenos. The species is distinguished by its greenish color, well rounded periphery, and the minutely *granulose* first (apical) whorl.

Var. ACARNANICA Kobelt. Pl. 31, figs. 50, 51.

Shell much smaller than the type, hardly shining, spire higher; aperture piriform-ovate, the margins much approaching.

Alt. 16, greater diam. 29, lesser 24 mill.

Ætoliko, Acarnania.

H. BROEMMEI Kobelt. Pl. 31, figs. 54, 55, 56, 57.

Shell openly and deeply umbilicate, but the umbilicus partially covered by the columellar margin; depressed-globose, nearly circular in circumference, roughly and irregularly ribbed-striate, and seen under a strong lens to be finely granulated by short transverse lines; little shining, rather solid, horn-brown with a broad light middle zone bordered on each side with darker, in which runs a sharply defined chestnut-brown band; spire convex with small, submamillar apex; whorls 6, slightly convex, rather slowly increasing, separated by a suture at first linear, but becoming more deeply impressed, and

very narrowly margined with white; last whorl large, nearly equally rounded above and below, abruptly and strongly deflected in front. Aperture oblique, broadly round-ovate, moderately lunate; brownish-white within, showing the band; peristome roof-like above; outer and lower margin reflected; columellar margin callously thickened, dilated above and vaulted over a part of the umbilicus. (*Kob.*). Alt. 21½, greater diam. 33, lesser 28 mill.

Klissura Pass, Akarnania, Greece.

H. broemmei Kob. in Rossm. Icon. n. f. p. 108, f. 943, 944.

Allied to *H. conemenosi.*

H. peritricha Boettger. Pl. 25, figs. 10, 11, 12.

Differs from *H. argentellei* in being a little higher, the upper whorls less convex, sutures less impressed, aperture a little wider; sculpture wholly different from that of *argentellei*, consisting of a broad peripheral band of short, stiff brown hairs, easily rubbed off, when they leave distinct hair-scars.

Alt. 13½–16, diam. 25½–29 mill.

Near Omblo and Kalandritsa, Achaia.

H. argentellei var. *peritricha* Bttg., Nachr. Bl. D. M. Ges. xvii, 1885, p. 118.—Kobelt, Rossm. Icon. n. f. v, p. 79, f. 889.—*H. peritricha* Kobelt, l. c., p. 110, f. 948–951.

In Kobelt's last cited publication he says that the study of ample material has enabled him to separate the small horn-colored Campylæas of Middle Greece from the *H. argentellei* of Southern Greece and from *H. subzonata;* and to establish their claim to specific rank under the name *peritricha*, the chief character of which is the broad equatorial zone of hairs or hair-scars.

H. krueperi Boettger. Pl. 31, figs. 48, 49.

Shell rather narrowly umbilicate, the umbilicus about one-eighth the shell's diameter; subdepressed-globose, rather thin, hardly translucent, pale olive-yellow with an indistinct chestnut-brown band which has no accompanying pale band. The entire surface is rather thickly beset with short, somewhat recurved hairs, of which there are about nine upon a square millimeter. Spire depressed, convex, but the apex rather acute; there are 5 rapidly increasing whorls, which are convex and separated by an impressed suture; the sculpture is a distinct, rather rough striation; last whorl very wide, double as wide as the preceding, well rounded below, strongly

deflected in front. Aperture oblique, broad, of a somewhat irregularly broad-ovate form; peristome whitish, slightly thickened, expanded throughout, somewhat reflected above; upper and outer margins well rounded; basal margin rather straightened, reflected, the margins approaching, connected by a thin callus; columellar margin oblique, much dilated, covering one-third of the umbilicus. (*Bttg.*). Alt. 17, greater diam. 32, lesser 24½ mill.

Taygetos, Greece.

H. (*Campylaea*) *krüperi* Bttg., Nachr.-Bl. D. M. Ges. 1891, p. 84. —Kobelt, Rossm. Icon. n. f. v, p. 110, f. 953.

It is well distinguished from *H. comephora* Bgt. by the more rapid increase of the whorls and especially the dilation of the last whorl; but as it is founded upon a single individual (the one figured), and as Mr. Kräuper has since found the true *comephora* (which name being etymologically incorrect has been changed to "comythophora" by Boettger) in the same place, it is not unlikely that the *krüperi* is merely an abnormal or pathologic phase of Bourguignat's species.

H. pouzolzi Desh. (Vol. IV, p. 87). The group of which this species is the type has been monographed by M. Bourguignat, (Bull. Soc. Mal. Fr. 1888, p. 203), who recognizes 18 species, most of which are merely individual variations, but some are local races or varieties. The following names are adopted: *H. dinarica* Bgt. (=*pouzolzi* Dh. not Payr.), *Kuzmici* Bgt, *pacici* Mlldff., *pellanica* Bgt., *montenegrina* Ziegl., *serbica* Mlldff., *adriatica* Bgt. *bosnica* Bgt. (=*bosniensis* Kob.), *varronis* Bgt., *tchernagorica* Bgt., *diocletiana* Bgt., *soccaliana* Bgt., *sabljari* Bgt., *horatii* Bgt., *biagioi* Bgt., *brenoica* Bgt., *daniloi* Bgt., *cantrainei* Bgt. The three names, *H. dalmatina* Parr., *gravosaensis* Mühlf., *ragusana* Fér. are mentioned by Bgt. as applied to species of this group, but not accompanied by descriptions.

Section Iberus Montfort (Vol. IV, p. 201.)

H. talamonica Kobelt. Pl. 34, figs. 65, 66.

Shell narrowly and nearly covered umbilicate, depressed-globose; solid, but not very thick; closely, subregularly ribbed-striate, smoother beneath; shining; buff-white, having four bands, the three upper interrupted; spire convex, apex small, white; whorls 5, convex, regularly increasing, separated by a linear hardly impressed

suture; the last whorl slightly dilated, rotund, slightly flattened below, deflected in front; aperture very oblique, almost circular, little lunate, white within; peristome thin, acute, distinctly lipped with white inside; margins converging, joined by a scarcely colored callus; upper margin straight; outer and basal margins little reflected; the columellar margin dilated and covering the greater part of the umbilicus, and slightly tinted with rose at the insertion. (*Kob.*)

Alt. 10, greater diam. 16½, lesser 14 mill.

Alt. 9½, greater diam. 15, lesser 13 mill.

Rocciedel Telegrafo, summit of Mt. Argentaro.

H. talamonica Kob., Rossm. n. f. v, p. 75, f. 880.

H. caltabellotensis Kobelt. Pl. 26, figs. 41, 42, 43.

Shell depresed-globular with rather circular circumference, entirely covered-umbilicate; the spire slightly conical, the apex small, smooth, but little projecting. Shell strong, but little shining, roughly rib-striate, and malleated; yellowish-white, four-banded, the upper three bands deep chestnut-brown, interrupted and coalescing into streaks; the fourth band upon the under side consisting of square and arrow-shaped spots: the entire pattern very beautifully distinct. There are five well-rounded, slowly increasing whorls, which are separated by a slightly irregularly impressed suture. The last whorl is somewhat inflated, at the periphery and below convex, suddenly strongly deflected in front. The aperture is very oblique, lunate-ovate, and with the exception of the light middle zone deep chestnut-brown within. The peristome is acute, thin, straight, having a distinct yellowish-white lip within. The nearly parallel, hardly converging margins are united by a very thin callus. The columellar margin is arcuate, but the concavity is occupied by a straight compressed fold. The umbilical region is of intense chestnut-brown color. (*Kob.*)

Alt. 13, greater diam. 20, lesser 18 mill.

Alt. 12½, greater diam. 17, lesser 15 mill.

Caltabellota, Sicily.

H. (*Iberus?*) *caltabellotensis* Kob., Rossm. n. f. iv, p. 72, f. 644, 645.

This peculiar form is separated from *globularis* (which is closely allied in sculpture) by the circular contour and strong inflation, as well as the umbilical spot.

H. SCABRIUSCULA var. VERRUCOSA Monterosato. Pl. 26, figs. 39, 40.

A local form, of which Kobelt's figures are copied.

Near Sciacca, Southern coast of Sicily.

H. (*Iberus*) *verrucosa* MONTS. *MSS.*, KOBELT, Rossm. Icon. n. f. iv, p. 73, f. 647.

H. NADORRICA Westerlund. Pl. 26, figs. 28, 29.

Shell depressed-trochoidal or inflated-lenticular; acutely keeled, umbilicus wholly concealed; spire low conical, the apex rather minute, smooth, somewhat mamillar and projecting; solid; nearly lusterless, closely ribbed-striate, the ribs occasionally bifurcating, the interstices malleated; on the base the sculpture is somewhat vermiculate. Greyish-white with indistinct bands and spots of darker color appearing in the interstices. Whorls 5, increasing slowly and regularly, and separated by a linear suture which is somewhat deeply impressed toward the aperture, and is rendered more prominent by the projecting keel. The upper whorls are smooth and rounded, the middle have an acute keel and are impressed above it, the last whorl is inflated, well rounded above and below, with acute compressed central keel; more inflated behind the aperture, and at the aperture somewhat constricted, suddenly and deeply deflected. The aperture is very oblique, ovate, with a sharp angle outwardly, the peristome being channelled there; the throat is chestnut-brown; peristome acute, having a yellowish-brown thickening within; the margins converge slowly and are connected by a thin light brown callus; the upper margin is simply arcuate, produced forward; the basal margin reflected, arcuately ascending, the concavity occupied by an acute, compressed, truncated fold; columellar margin dilated at insertion, appressed, having a chestnut-brown umbilical spot. (*Kob.*)

Alt. 12½, diam. 19 mill.

Sciacca and Nadorra, South coast of Sicily.

H. bülowi var. *nadorrica* WESTERL., Fauna, p. 371.—KOBELT, Rossm. Icon. n. f. iv, p. 73.—*H. tumidosa* Monts. *MSS.*, KOB., ibid., p. 72, f. 646.

Distinguished from *H. paciniana* by the more convex whorls and greater smoothness. Westerlund considers it a form of *H. buelowi*.

Group of H. sultana.

This group of keeled *Iberus* is closely allied on one side to *H. gualteriana* of Spain, on the other to the extensive group of *H. scabriuscula*.

in Sicily and Sardinia. All are characterized by keeled whorls and microscopic spiral striæ.

The following forms belong to this group: *H. sultana* Morel., *H. leachii* Fér., *H. quedenfeldti* Marts., *H. viola* Pons. and *H. culminicola* Kob.

The specimens of *H. sultana* before me have two narrow, light-brown bands below, one or none above.

H. CULMINICOLA Kobelt, *MSS.* Pl. 28, figs. 95, 96, 97.

Shell partly-covered perforate, depressed, thick lens shaped, very strongly carinated, rather thin, soiled whitish with very faint traces of three bands above, one below the keel. *Surface coarsely obliquely wrinkled* above and below, the wrinkles occasionally branching; and under a strong lens the whole surface is densely spirally striated.

Spire low-conic, apex obtuse. Earliest 1¼ whorls smoother, corneous-brown, forming an *embryonal shell of 2⅓ mill. diameter.* Whorls 4–4¼, convex below the suture, then concave toward the peripheral keel, the last whorl wide, convex below, strongly compressed on each side of the prominent carina, rather strongly deflexed in front.

Aperture very oblique, oval-rhombic, deeply channelled at the peripheral keel; peristome thin, white, expanded, becoming reflexed at the base and columellar margins.

Alt. 10, diam. 20½ mill.

Highest peak of the Angera Mts., between Tangier and Tetuan (John Ponsonby.)

I am indebted to Mr. John Ponsonby for this hitherto unpublished species. It agrees with *H. sultana* Morel. in the partly covered umbilicus; thin, adnate parietal callus, and small embryonic shell; but it differs in being smaller and far more coarsely wrinkled. It agrees with *H. viola* in the wrinkled surface, but differs in the smaller umbilicus and especially in the much smaller embryonic shell.

H. VIOLA Ponsonby. Pl. 26, figs. 50, 51, 52.

Shell narrowly umbilicated, depressed, thick lens-shaped, rather thin, lusterless, whitish with a faint brown band just above the carina, a narrower band above it and another below the suture; below the carina there is a faint band. *Surface very coarsely rudely wrinkled* above and below, the wrinkles oblique, irregular, sometimes

branching; and under a strong lens the whole surface is seen to be densely spirally striated.

Spire low-conic, apex obtuse. *Earlier* 1½ *whorls horny, subconvex; lacking wrinkles, and forming a comparatively large nuclear shell, about* 4 *mill. diam.* Following whorls wrinkled, rather rapidly widening, flat; the last having a strongly compressed peripheral carina, swollen below, deeply descending in front. Aperture very oblique, ovate-rhombic, its contour hardly interrupted by the parietal wall; lip thin, expanded, *continued in a free lamella across the parietal wall.* Alt. 10, diam. 22 mill.

Angera (Andjera) Mts. northern Morocco.

H. viola Pons., in Kob., Nachrichtsbl. D. M. Ges. xxi, p. 12, 1889; Rossm. Icon. n. f. iv, p. 74, f. 648.

This species belongs to a small African group which comprises *H. sultana*, *H. culminicola* and *H. viola*. It is distinguished from the former two by the wider umbilicus, slightly elevated parietal wall of the aperture, and especially by the much larger size of the embryonal shell, the junction of which with the after-growth is marked in all these forms by a rather sudden but irregular widening of the whorl. My description is from specimens received from Ponsonby.

H. quedenfeldti v. Martens. Pl. 34, figs. 67–71.

Shell covered imperforate, carinated, globose-lens-shaped, solid but not thick, sculptured with oblique close riblets parallel with the aperture, which disappear toward the umbilicus; grayish-brown having five interrupted subobsolete brown bands; spire roof-shaped, apex rather large, smooth. Whorls 4, rapidly increasing, the first smooth, convex, the following flattened, encircled by a thick, more or less prominent keel; last whorl large, angulate, inflated below, abruptly deeply deflected in front; the carina disappearing on the latter part of the body-whorl. Aperture very oblique, subcircular, little lunate; peristome shortly expanded, whitish; margins much converging, joined by a distinct callus; the upper and outer equally arched; basal dilated, appressed. (*Kob.*)

Alt. 10, greater diam. 17, lesser 14 mill.

Misselata, Tripoli.

H. quedenfeldti Mts., Sitzungsber. Ges. Naturf. Freunde zu Berlin 1890, p. 79.—Kobelt, Nachr.-Bl. D. M. Ges. 1890, p. 213; Rossm. Icon. v, p. 76, f. 881, 882; Nachr.-Bl. 1891, p. 140.

This interesting species may belong to the group of H. *sultana* Morel., but it differs from the species of that group in the more inflated form and the presence of *five* bands, instead of four, the normal number in *Iberus*. Kobelt, who has studied and figured the type specimens, believes that it may prove to be a second species of the group *Allognathus*.

* * *

H. RIDENS Martens. (Vol. IV, p. 210). Pl. 26, figs. 25, 26, 27.

H. SARDONIA Martens. (Vol. IV, p. 204). Pl. 26, figs. 33, 34, 35, 36, 37.

H. SARDONIA var. DORGALIENSIS Maltzan. Pl. 26, fig. 36.

H. BUELOWI Maltzan. (Vol. IV, p. 225). Pl. 26, figs. 30, 31, 32.

H. SUBURBANA Paulucci. (Vol. IV, p. 217). Pl. 26, figs. 43, 45, 46. Kobelt (Rossm. Icon. iv, p. 6, 7) holds that this is specifically distinct from *cenestinensis*.

H. ISARÆ Paulucci. (Vol. IV, p. 215). Pl. 26, figs. 47, 48, 49.

H. MAGNETTII Cantraine. (Vol. IV, p. 215, 216, pl. 54, figs. 22, 23.) Kobelt restores this name to the "*hospitans* Bonelli" of Mme. Paulucci, which was never described by Bonelli.

H. ROLLEI Maltzan. (Vol. IV, p. 225). Pl. 34, figs. 72, 73.

H. WEBERI Kobelt. This name is proposed to supercede that of *platycheloides* Kob., the latter being preoccupied for a fossil species.

H. ÆGOPINOIDES Maltzan. Pl. 28, figs. 91–94.

See Vol. IV, p. 232, where this species is described under *Levantina*. I am indebted to Mr. Ponsonby for specimens of this remarkable species, which turns out to belong to the genus *Zonites*. Kobelt has proposed a sectional name *Cretozonites* for it; see also Westerlund, Verh. Zool.-bot. Ges. Wien, 1892, p. 26.

Section *Levantina* Kobelt. (Vol. IV, p. 226.)

H. WERNERI Rolle. Pl. 38, figs. 88, 89, 90.

Shell entirely covered umbilicate, obliquely depressed, globose, solid, but not thick; irregularly rudely striated, striæ oblique, more distinct at the suture; sculptured with short, transverse impressions

and irregularly malleated. Buff-whitish, ornamented with five narrow, obscure, interrupted bands; spire depressed globose, apex rather large, obtuse, smooth; whorls 5½, rapidly increasing, the first two smooth, round, the following convex with distinctly subserrate carina in the impressed suture, the penultimate whorl convex; last whorl inflated, very indistinctly angulate at the periphery, excavated at the place of the umbilicus, the base rounded; in front it descends slightly at first and then is deeply and abruptly deflected. Aperture very oblique, broadly rotund-ovate, distinctly lunate; peristome acute, narrowly reflected outwardly, basal margin distinctly lipped with white; margins converging and joined by a callus which is usually very thin but sometimes thickened and brown tinted, the basal margin calloused, dilated, at first obliquely ascending and sometimes obtusely toothed, then directed vertically or toward the right, and bounded outside by distinct grooves. (*Kob.*)

Alt 27½, greater diam. 36, lesser 30 mill.

Adana, Cilicia.

H. (*Levantina*) *werneri* Rolle *MSS.*, Kobelt, Nachr. D. M. Ges. xxi, 1889, p. 138; Rossm. Icon. n. f. iv, p. 76, f. 653–655.

Belongs to the *spiriplana* group, but is very distinct in the inflated form.

H. urmiensis Naegele. Pl. 28, figs. 85, 86, 87.

Shell covered umbilicate, depressed, solid, rudely and closely striated, showing under the lens spiral lines on the upper part of the last whorl toward the aperture, here and there malleated; having a satin like lustre; bluish-white, having very obsolete brown bands and scattered brownish-black dots; spire little elevated, apex large, obtuse, bright reddish-corneous; whorls 4½, separated by a linear subimpressed suture, slightly convex, hardly carinated; the last compressedly rotund, descending in front, and then suddenly much deflected; base slightly convex or somewhat flattened; aperture very oblique, rounded-ovate, lunate; peristome slightly reflected throughout, thickened with whitish, somewhat obtuse; the margins converging, joined by a very thin callus; basal margin thick, reflected, having a tooth-like fold within, broadly dilated at the insertion and almost closing the umbilicus. (*Kob.*)

Alt. 16, greater diam. 30, lesser 25 mill.

Province Urmiah, northern Persia.

H. urmiensis Naegele *MSS.*, Kobelt, Nach. D. M. Ges. xxi, 1889, p. 139; Rossm. Icon. n. f. iv, p. 75, f. 651, 652.

Allied to *H. ceratomma* Pfr., but having a wider umbilical chink, the lip-terminations more approaching, joined by a thin (in old examples a thick) callus; the spiral sculpture is developed only on the last whorl above, and is much weaker; and the aperture is less oblique.

H. NINIVITA Galland. Pl. 34, figs. 55, 56, 57.

Shell broadly umbilicated (the umbilicus much dilated toward the aperture and elliptical), depressed, slightly convex; strongly striated above, finely below; unicolored whitish or gray-white, with faint white flecks and two interrupted chestnut-brown bands. Whorls 5, irregularly increasing, the first two flattened, acutely keeled at the suture, the following narrowly coiled, somewhat convex, the last whorl very large, rounded, elevated above the penultimate in front and then deeply descending. Aperture very oblique, transversely oval-rotund; peristome continuous, thick, broadly expanded and reflexed.

Alt. 10, diam. 39 mill. (*Westerl.*)

Mossul, Kurdistan.

H. ninivita GALL., Bull. Soc. Mal. Fr. 1885, p. 234, t. 7, f. 9–11.—WESTERL. Fauna, p. 396.

Section POMATIA Beck (Vol. IV, p. 232.)

H. MAZZULOPSIS Ancey, n. sp. Pl. 46, figs. 41, 42.

Shell globose conoid, higher than broad, imperforate, rather thin; whitish-corneous under a very thin (deciduous?) yellowish cuticle, with 5 dark brown bands, the 3d and 4th wider; and *sculptured with very unequal, irregularly spaced, opaque white, oblique wrinkles.* Spire conoidal, apex obtuse, the earlier 1½ whorls smooth, corneous, brown at the sutures; following whorls banded and wrinkled, very rapidly increasing, the last sloping above, ventricose below, descending in front. Aperture oblique, ovate, showing the bands within; lip simple, thin; columella broadly arcuate.

Alt. 32, diam. 27 mill.; oblique alt. of aperture 25 mill.

Alt. 38, diam. 32 mill.; oblique alt. of aperture 28 mill.

Jurjura Mts., Algeria.

This species differs markedly from *H. mazzulii* in the coarse, unequal, unevenly spaced white wrinkles. It resembles the Sicilian species in contour. I have been unable to find any description or

mention of this form in the literature, but it is an unusually well-marked species.

H. AMBIGUA Parr. var. ÆTOLICA Kobelt. Pl. 46, figs. 38, 39.

Differs from the type in being larger, more dilated, the spiral lines almost completely absent; bands 5, either all confluent on the latter part of the whorl, or the upper and lower ones uniting to form two wide bands. (*Kob.*, in Rossm. Icon. n. f. v, p. 106, f. 936, 937.)

Alt. 41, greater diam. 41, lesser 35 mill.

Alt. 42, greater diam. 45, lesser 37 mill.

Environs of Vrachori, Aetolia, Greece.

The lettering on Kobelt's plate is "*H. ambigua* var. *acarnanica*."

H. VALENTINI Kobelt. Pl. 46, figs. 58, 59.

Shell imperforate, conic-globose, solid, thick, smooth, but showing close fine spiral lines under the lens, and rather blunt regular lines of growth; here and there malleated; whitish, stained here and there with reddish-brown, having five reddish subequal bands, the second and third becoming confluent toward the aperture; spire elevated, conical, apex large, white, flattened; whorls 5, convex, separated by irregularly and slightly impressed suture, regularly and rather rapidly increasing, the last large, deeply descending in front; aperture oblique, lunate, rounded, bluish-white within, showing the bands; peristome straight, obtuse, thick; margined with reddish-brown within, and then having a thick whitish lip; margins subparallel, joined by a thin brown callus; columellar margin thick, reddish-brown, straightly ascending. (*Kob.*)

Alt. 46, diam. 44 mill.

Kalymnos, Greece.

H. (Pomatia) valentini KOB., in Rossm. Icon. n. f. v, p. 27, f. 772.

Allied to *H. secernenda* Rossm., of Dalmatia.

H. ASEMNIS Bourg. (Vol. IV, p. 245). Var. HOMERICA Martens. Pl. 46, fig. 40.

In general characters agreeing with the descriptions and figures of the type, but thin shelled, somewhat shining, pale reddish-gray, with two broad, dark red-gray bands (formula 123 and 45, as usual in *cincta*); as high as wide, or higher; peristome scarcely thickened, the columellar margin pure white, beautifully arched, proportionately narrow, especially the reflection upon the umbilical tract and parietal wall very thin, hardly noticeable, and without definite

boundary outwardly. Mouth dark inside. Large examples are 40–41 mill. high and of the same breadth; other smaller ones comparatively higher, alt. 38–39, diam. 33½–37 mill., somewhat duller and darker, the dilation of the columella rather stronger. (*Mts.*, Archiv. für Naturg. 1889, p. 195, t. 11, f. 4.)

Islands Chios and Syme, Ionian Archipelago.

H. (POMATIA) BEILANICA (Desch. in sc.) Westerl. *Unfigured.* Verh. k.-k. Zool.-bot. Ges. Wien, xlii, p. 34. Syria, near Beilan.

Section MACULARIA Alb. (Vol. IV, p. 128).

H. INTUSPLICATA Pfr. (Vol. IV, p. 144). Pl. 31, figs. 58, 59, 60.

Additional figures of this species are here given, showing its wide range of variation in size and color-pattern.

Unfigured Maculariæ.

H. leucochila Westerlund, Nachr.-Bl. D. M. Ges. 1892, p. 191, Seville, Spain. Nearest to *H. asteia* Bgt.

Genus HEMITROCHUS Swains. (Vol. V, p. 24.)

H. STREATORI Pilsbry. Vol. IX, Pl. 36, figs. 7, 8, 9.

Shell imperforate, depressed, thin but rather strong, resembling in contour *Hemitrochus amplecta* Gundlach of Cuba. It is white, with *dark purplish-brown apex and a narrow, continuous, well-defined supraperipheral band* of the same color. Above this band there are two lighter, interrupted subobsolete bands (sometimes confluent into one); on the base there is a zone composed of several interrupted lines or narrow bands, close together or confluent, broken into blotches, fading into the ground-color on the edges, with a tendency to form short streaks in the direction of the growth lines. Surface lining, finely obliquely striate, except the smooth 1½ apical whorls. The spire is low-conoidal; apex blunt; sutures evenly, moderately impressed; whorls 4½, slightly convex, the last depressed, deflexed toward the aperture. Aperture very oblique, transversely oval, obliquely truncated by the parietal wall, distinctly showing a band within; peristome thickened inside, upper margin simple, outer a little expanded, basal narrowly reflexed, *brown*, appressed over and closing the narrow axial perforation.

Alt. 7, greater diam. 12, lesser diam. 10 mill.

Cayman Island.

Helix (Hemitrochus) streatori PILS., Proc. A. N. S. Phila. 1889, p. 413, t. 12, f. 1.

H. streatori belongs evidently to the section *Hemitrochus*; and like the other species of that division the axis is perforated in young shells. There is a general resemblance in form and color-pattern to *H. amplecta* but that shell and its allies are umbilicate. Its affinity is greatest with *H. caymanensis*, and with Tryon's *H. guassoini*, described from the tiny islet of Navassa, but the *streatori* is more depressed than *guassoini*, with more oblique aperture, fewer more rapidly enlarging whorls, etc. *H. streatori* differs from *caymanensis* in the dark apex and lip, and the continuous supraperipheral band, etc. These shells, *guassoini*, *streatori* and *caymanensis* should be inserted in my monograph of *Hemitrochus* in the Manual of Conchology immediately following the group of *amplecta*, *rufoapicata* and *graminicola* (p. 37). It may be noted that with the exception of the last-named form, these three are the only species of *Hemitrochus* ranging south of Cuba.

H. CAYMANENSIS Maynard, n. sp. Pl. 56, figs. 10, 11, 12.

Shell imperforate, depressed, with low-conoidal spire. Surface shining, sculptured with fine growth-lines, which generally show a tendency to form spaced costulæ; pale buff-white, having *four spiral bands composed of oblique rhombic spots*, two bands above, one at the periphery and one broader band on the base.

The spire is low but conoidal, apex obtuse, whitish or light brown; whorls 4½–4¾, convex, the last rounded at the periphery, rather flattened beneath, rather deeply and suddenly deflexed in front.

Aperture quite oblique, truncate-oval, white and showing the bands within; peristome very little expanded, acute, spotted by the terminations of the bands; strengthened by a narrow rib or lip within; columellar margin sloping, nearly straight, closely reflexed and adnate at the axis; termination of the peristome remote.

Alt. 8½, greater diam. 12½, lesser 11 mill.

Alt. 8½, greater diam. 11, lesser 9½ mill.

Little Cayman Island.

This species is closely allied to *H. streatori* Pils., and may prove to be a variety of that species; but it differs in the less reflexed basal lip, the light-colored apex and peristome, and the spotted bands.

H. MAYNARDI Pilsbry. Pl. 56, figs. 13, 14, 15.

Shell nearly-covered umbilicate, depressed, rather thin. Spire slightly convex, apex obtuse. Surface sculptured with prominent thread-like striæ in the direction of growth lines; pale fleshy brown,

having a supraperipheral chestnut zone and numerous bands of a lighter brown both above and below, all bands sometimes lacking. Whorls 4½, convex, the first smooth; sutures impressed; last whorl rounded at the periphery, deeply descending in front. Aperture transversely oval, oblique; outer lip slightly expanded, slightly thickened within; baso-columellar lip reflexed, nearly straight, the columella thickened by a strong callus within, which is more or less truncated below.

Alt. 7½, greater diam. 12⅔, lesser 11 mill.

Bahamas.

H. (*Plagioptycha*) *maynardi* Pils., Nautilus, Nov., 1891, p. 83; Proc. A. N. S. Phila., 1891, p. 456.

This is one of those species lying somewhat between *Plagioptycha* and *Hemitrochus*. It resembles the form described by me as *H. brownii* in the surface-sculpture, which is decidedly coarse, as in *H. albersi*. The brown bands of the surface are visible on the face of the thickened and slightly expanded lip, but they are sometimes absent.

H. xanthophaes Pilsbry. Pl. 57, figs. 20, 21, 22.

Shell small, subglobose, solid, narrowly rimate. Spire low-conoid, the apex obtuse. Surface shining, having irregular growth-lines more conspicuous just below the suture. Streaked with reddish-chestnut on a pale isabelline ground, having an inconspicuous paler line at the periphery and a dark band just above it, the latter sometimes obsolete. Whorls 4, separated by slightly impressed sutures, the last whorl very obtusely subangular at the periphery, slightly descending in front.

Aperture half-round, oblique; peristome not in the least reflected, thickened and pinkish within, showing the band when present. Columella steeply sloping, straight, forming an obtuse angle with the basal margin; its upper two-thirds flatly reflexed to form a triangular plate nearly concealing the umbilicus.

Alt. 6¼, greater diam. 8, lesser 7⅓ mill.

Alt. 10, greater diam. 11½ mill.

Inagua, Bahamas.

Helix (*Hemitrochus*) *xanthophaes* Pilsbry, Nautilus, Nov. 1891, p. 83; Proc. A. N. S. Phila. 1891, p. 456.

This is the smallest species yet known of the *Hemitrochus* group of Helices. It has the same general coloring as the var. of *H. rari-*

ans figured by Dr. A. Binney in Terr. Moll. III, p. xlvi, lowest fig., but the streaks are of a rich reddish-chestnut. It is also, in coloring, very similar to the form of *H. milleri* which I have figured on pl. 32, fig. 40 of the Manual of Conchology (2), vol. V. From this species, which is its nearest ally, the *H. xanthophaës* is distinguished by its smaller size, smoother surface, more flatly and angularly reflexed columella, etc.

The typical coloration is described above, but additional examples show much variation. Some are a delicate pink-white with a white or dark peripheral band, or both, as described above, the apical whorls purple or red-brown. The peculiar form of the columella is constant, as is also the extremely narrow umbilical fissure, which is practically the same at all stages of growth.

Genus COCHLOSTYLA (Fér.) Semper. (Vol. VII, p. 92.)

The number of sections recognized in Vol. VII, although already large, should probably be increased by two: *Crystallopsis* Ancey, including the Papuan and Solomon Island forms hitherto referred to *Corasia*, and *Papustyla* for the species *translucida* Q. & G., *papuensis* Hedley, *hindei* Cox and *heimburgi* Branc.

Section CRYSTALLOPSIS Ancey.

The axis is perforated, at least in the typical forms, although often covered in the adult; and the jaw (of *C. conformis*) is smooth, although the rest of the anatomy is like *Cochlostyla*. This difference in the jaw is quite insufficient to cause us to remove the section from *Cochlostyla*; for cases of odontognathous Helices becoming oxygnathous by degeneration of the ribs of the jaw are common. This modification is usually not accompanied by any important changes in other organs, and in many groups is of barely specific value. For the present, this section may include groups 1 and 2 of my arrangement of *Corasia* in Vol. VII, p. 105.

Vol. VII, page 106. For *allisteri*, read *allasteri*.

C. WOODFORDI Sowerby. Pl. 57, fig. 14.

Shell imperforate, subconvex, thin, pellucid, buff-white, irregularly malleated, obliquely striated, spire short conical, rather obtuse. Whorls 4, rapidly increasing, slightly convex, the last inflated, acutely carinated at the periphery, with an opaque white line at the carina. Aperture large, oblique; *peristome reflexed, red.* (*Sowb.*) *Guadalcanar, Solomon Is.*

Helix (*Corasia*) *woodfordi* SOWB., P. Z. S. 1889, p. 578, t. 56, f. 6.

A small, delicate species, having a prominent white keel and a thin pink lip. Specimens were collected by Mr. Woodford, and are now in the British Museum.

C. AGGIEI Heimburg. Pl. 57, figs. 7, 8, 9.

Shell almost covered rimate-perforate, depressed-globose, thin, pellucid, obliquely closely plicatulate, decussated by fine spiral lines. Almost colorless, begirt with numerous milk white bands, sometimes splitting. Apex obtuse; whorls 4, rapidly increasing, convex, the last large, not descending in front, inflated below, carinated at the periphery. Aperture large, lunate-ovate, three-fourths the height of the shell, oblique; peristome broadly reflexed, columellar margin much dilated, covering and almost closing the narrow umbilicus.

Greater diam. 27, lesser 19 mill.; aperture oblique alt., including peristome 17, width 18 mill. (*Heimb.*)

Solomon Is.

Helix aggiei v. HEIMB., Nachr. Bl. 1890, p. 191; Malak. Bl. (n. F.) xi, p. 158.

This form should possibly be considered a variety of *C. allasteri* Cox, from which it differs in the narrower umbilicus and apparently in the somewhat stronger sculpture.

C. TENIMBERICA Möllendorff. For figs. see Vol. IX.

Shell imperforate, subdepressed-globose, thin, diaphanous, shining, minutely, closely and distinctly plicate-striate, decussated with spiral impressed lines, more distinct below the carina; malleated, buff-whitish; spire subhemispherical, the apex nearly flat. Whorls 3½–4, rapidly increasing, separated by a subappressed, margined suture, slightly convex, the last whorl obtusely carinated at the periphery, somewhat excavated below the carina, much inflated beneath, subcompressed and a little gibbous around the columellar. Aperture very oblique, broad ax-shaped, the peristome very narrowly expanded above, thin, acute, a little expanded below and somewhat labiate; columella compressed, subexcavated, straightened, forming an indistinct angle where it joins the basal lip.

Alt. 16½, diam. 23½ mill.; aperture width 15, length 14, alt. 12½ mill. (*Mlldff.*)

Tenimber Is.

Cochlostyla (*Corasia*) *tenimberica* MLLDFF., Nachr.-Bl. D. M. Ges. 1892, p. 97, t. 1, f. 2.

122. After *C. æruginosa*, read Pl. 26, fig. 4.

Unfigured species.

Cochlostyla (*Corasia*) *sarangaica* MLLDFF., Nachr.-Bl. 1890, p. 204. (=*C. indusiata* HID., J. de C. 1887, p. 137, not Pfr.) Island Sarangani, off Southern Luzon.

Cochlostyla (*Orthostylus*) *amalia* MLLDFF., Nachr.-Bl. 1890, p. 206, Albay, Luzon.

Section CALOCOCHLEA Hartm. (Vol. VII, p. 129.)

Vol. VII, page 139. C. PERAFFINIS. Dr. O. v. Möllendorff writes me that this is merely a form of *polillensis*.

C. SEMIRUFA Albers. *Unfigured.*

Shell imperforate, conoid-globose, rather thick, obliquely striated; yellowish-white, encircled at suture and periphery with a narrow reddish band, ornamented beneath with a wide rufous band and columellar area. Whorls 4½, nearly flat, the last obtusely angularly; spire conoid, apex obtuse, dull roseate. Columella very oblique, widely expanded, white. Aperture lunate-rounded; peristome expanded, slightly reflexed, brown.

Alt. 25, greater diam. 40, lesser 34 mill. (*Alb.* from specimen in Berlin Mus.)

Feejee Is.?

Helix (*Callicochlias*) *semirufa* ALB., Die Hel., p. 106.

C. LUENGOI Hidalgo. Vol. VII, pl. 61, fig. 21.

Imperforate, subglobose, thin, subpellucid, little shining, sculptured with very delicate growth-lines. Uniform pale tawny covered with a dull buff cuticle. Spire moderate, apex rather obtuse, suture simple. Whorls 4½, convex, the last scarcely descending in front, slightly exceeding one-half the total length. Aperture rounded-subquadrate, columella whitish, suboblique, deeply twisted below; peristome expanded, regularly arcuate, whitish within, forming somewhat of an angle where it joins the columella.

Alt. 40, greater diam. 43, lesser 40 mill. (*Hid.*)

Philippines.

C. luengoi HID., Journ. de Conch. 1888, p. 311; *l. c.* 1889, t. 14, f. 3.

The sculpture consists of growth-striæ very closely placed, with oblique striæ between them, crossed by very fine transverse striæ. This sculpture is visible only when strongly magnified, especially on the upper surface of the last whorl. (*Hid.*)

This species is probably a *Calocochlea* allied to *C. samarensis* Semper.

C. HIDALGOI Möllendorff. (Vol. VII, pl. 54, figs. 41, 42.)

According to v. Mlldff. this is not the *samarensis* of Semper, but a new species. It is *C. samarensis* Hidalgo.

Sibuyan, Philippines.

C. SUPRABADIA Semper. Pl. 17, figs. 26, 27.

Imperforate, depressed-turbinate, rather solid, striated and brown above, shining and white beneath. Spire obtuse, buff, apex roseate. Whorls 5, slowly increasing, the last having a brown girdle at the periphery. Columella subexcavated, sloping, white, entering; aperture rotund-lunar, white, black at the edge; peristome simple, scarcely reflexed, black. (*Semper.*)

Alt. 30, greater diam. 36, lesser 30 mill.

Near Satpat (Iraya, Luzon.)

C. (*Orthostylus*) *supra-badia* SEMPER, Reisen, p. 201, t. 9, f. 7.

Apparently a very distinct species, but its sectional position is not clear to me.

Section HELICOSTYLA Fér. (Vol. VII, p. 171.)

Page 178. Lea's name *viridostriatus* takes precedence over *polychroa*, having several months priority.

Section ORUSTIA Mörch.

C. VERSICOLOR Möllendorff, n. sp.

Shell globose, slightly conoidal, the apex obtuse. Color under the hydrophanous cuticle whitish or reddish brown, the earlier 1½–2 whorls purple or purple-brown. Cuticle russet brown with darker bands at suture and on each side of two conspicuous cream-white bands which girdle the body-whorl, the upper one ascending the spire.

Whorls 4¾, slightly convex, the last well-rounded, deflexed in front. Aperture oblique; lip blunt, a trifle expanded, flesh-colored; columella rather wide, pure white.

Alt. 20, diam. 20½ mill.

Alt. 17, diam. 18 mill.

Nueva Ecija, Luzon, Philippines.

C. (*Orustia*) *versicolor* MLLDFF., *ms.*

This beautiful species will be illustrated in Vol. IX.

Section ORTHOSTYLUS Fér.

Vol. VIII, p. 34. *C. cossmanniana* is merely a form of *C. quadrasi*, the intergradation being proven by a series of specimens sent me by v. Möllendorff, who holds the same opinion.

Genus VALLONIA Risso. (Vol. III, p. 169.)

NOTE.—The following account of this genus has been contributed by DR. V. STERKI of New Philadelphia, Ohio. A more detailed monograph will be found in the Proc. Acad. Sci. Phila. 1893.

Shell minute (1·8–3·5 greater diam.), openly umbilicated, with flat or moderately elevated spire, colorless or yellowish to reddish horn colored, transparent or diaphanous, without bands or markings of any kind, surface finely striated or with membranous ribs; whorls 3–4, rounded; aperture nearly circular or transversely somewhat elongate; peristome everted or straight, with or without a whitish lip.

The last whorl, in the majority of the species, descends in front to the aperture, either as a whole or at the suture only, while the back of the whorl keeps straight to the very margin. Also in a number of species the last whorl ascends distinctly before it descends (see pl. 33, figs. 33, 37). These features, not pointed out in previous descriptions, are quite marked and characteristic in certain forms. In size it must be said that the altitude of *the whole shell* is given.

The soft parts are like those of Helix externally, whitish translucent; a few pale yellowish spots in the mantle, near its edge, is all the pigment seen. The pedal disc is comparatively small, about as long as the diameter of the shell; eye peduncles slender, tentacles short but distinct. Jaw rather stout, rather short, arcuate, ends attenuated, rounded or truncate, with irregular sharp rib-like striæ, denticulating the cutting edge, which, in some forms, shows a slight, wide, median projection. On the back of the jaw, about the middle, there is a strong transverse lamella which passes into the tenaculum membrane. Radula with 65–85 transverse rows of 23–35 teeth; the median narrow, its reflection having three very small cusps; laterals 5–6, or fewer, with a rather strong mesodont and a short ectodont becoming two-pointed in the outer ones. Marginals wide, short, pectinate rather than serrate, as their 5–7 cusps are long and slender like the teeth of a comb; the one or two outer teeth have hardly any perceptible cusps.

Vallonia is widely distributed over the northern part of the old and new continents, extending to northern Africa, the Atlantic islands, Indo-China, and the southern United States. It has been found in Australia and Mauritius, undoubtedly introduced, as it probably is or will be in other suitable localities. Geologically it is an old form of Helicidæ. It is a common fossil in the Loess of Europe and North America, and in Europe has been found in lower Eocene strata and many subsequent deposits. In this antiquity of the genus, we find the key to its wide geographic distribution.

These small snails live in moss and among dead leaves, under decaying wood and stones and are very sensitive to light. By heavy rains the dead shells are washed down and are sometimes found in immense numbers in fine drift material along streams and rivers.

In characters of the shell and the soft parts, Vallonia is a well defined genus. The features are very uniform, and the comparatively large number of species now known require close attention to distinguish them. A few certainly will need revision, but most of them appear to be valid. A single species, the *V. pulchella* of Müller, has been recognized generally for almost a century; and *V. costata* having been regarded as a ribbed variety, it is evident that all the older reports as to geographical distribution must be received with reserve, as necessarily quite a number of different forms were comprised under one or two names by the older authors, and by some even up to the present day.

(1) *Group of V. pulchella.*

Aperture crescentic, forming about five-sixths of a circle; surface very finely striated.

V. PULCHELLA Müller. Pl. 32, figs. 1, 2, 3, 4, 5.

Moderately umbilicated, more widely for the last half whorl; convex or depressed conic above; *straw colored*, transparent, *with fine and dense striæ* which are more regular at the suture and umbilicus; smooth at the nucleus; whorls 3½–4, rather rapidly increasing, with a moderately deep suture, the last comparatively large, well rounded, little expanded toward the aperture, *not descending in front*, or slightly so at the suture. Aperture moderately oblique and inclined, forming five-sixths of a circle; *peristome* abruptly *everted*, with *a strong white lip*, thinner at either end.

Alt. 1·2, greater diam. 2·4, lesser 2·0 mill.

Circumboreal. Europe, eastern and northern Asia, northern Africa, the Azores and Madeira, greater part of *North America;* also *Australia and Mauritius* (introduced) (? Pacific slope, and eastern Asia.)

Hel. pulchella MULL., Verm. Hist. II, 1774, p. 30, and of authors! —*Hel. paludosa* DA COSTA, 1780.—*Hel. crystallina* DILLW., 1817.—*Hel. pulchella* var. *lævigata* MOQ.-TAND., 1855.—*Hel. minuta* SAY, Journ. Acad. Phila., 1817, p. 123, and Nicholson's Enc. Ed. 3, 1819. —*Vallonia minuta* MORSE, Pulmonif. Me., 1864, p. 21 (? part).—TRYON, Am. Journ. Conch. III, 1867, p. 36 (?)—*Vallonia pulchella* W. G. BINNEY, Terr. Moll. V, p. 344; Man Am. Land Shells, 1885, p. 77.

The last whorl is slightly ascending or descending in front, in a good part of the specimens. Sometimes the shell is whitish, milky-opaque, in living examples; this seems to be a local variation, as all the specimens in certain places show this peculiarity. The size of the shell varies from 2·1 to 2·7 greater diam., 2·4 being the average.

Jaw rather strongly curved, with obtuse ends; no median projection on the cutting edge, which is denticulated corresponding to the 10–20 rather sharp, longitudinal ribs, quite irregular in size, course, and distribution, but wanting at the side ends of the jaw. The radula has 65–68 transverse rows of 27 teeth; of the five laterals the fifth has a small plate and the ectodont double pointed.

For the question concerning the identity of *V. minuta* Say, see under *V. excentrica.*

Var. ENNIENSIS Gredler.

A form with strong, rib-like striæ, but without membranous ribs, the other characters as in the type. (*Gredler*, Tirol's Conchylien, 1856.)

Neumarkt Hall and Botzen in Tirol; Grasse, France.

Var. PERSICA Rosen.

Differs from the type in having the last whorl descending to the aperture; the latter with widely expanded, flat [plano] peristome. (*Rosen*, Nachr. Bl. D. Mal. Ges. 1892, p. 123.)

Schamhala, Prov. Chorassan, Persia.

This may be a form distinct from *pulchella.*

V. EXCENTRICA Sterki, n. sp. Pl. 32, figs. 6, 7, 8, 9.

Moderately umbilicated, the *umbilicus elongate, rapidly widening for the last ⅓ whorl;* slightly convex above; pale horn colored, trans-

parent or slightly opaque, with a somewhat fatty gloss, *smooth or very finely* and irregularly *striate*, smooth at the nucleus. Whorls 3–3½, rather rapidly increasing, with a moderately deep suture, the last comparatively large, well rounded, *expanding* toward the aperture, *not descending* in front. Aperture moderately oblique and inclined, forming five-sixths of a circle, subangular at the base, the umbilical margin somewhat protracted; *peristome everted only in the inferior part*, with a rather strong *white lip, shining through the shell.*

Alt. 1·1, greater diam. 2·3, lesser 1·8 mill.

Europe and eastern North America; Pyrenees; France; Lyons; Germany; Metz, Dresden and other places in Saxony; Austro-Hungary; Brosteni in the Carpathien Mts.; Jura Mts. near Brugg in Switzerland; Washington, D. C.; Staten Island, N. Y.; Princeton, N. J.; New Bedford, Mass.; Saco and other places in Maine; Halifax, N. S., Quebec, Canada; New Philadelphia, Ohio. Everywhere together with *V. pulchella.*

Jaw moderately curved with a slight, wide median projection on the cutting edge; with rather fine dense, sharp, irregular ribs all over. Radula with 81–84 transverse rows of 29 teeth; 5 laterals; on the marginals the cusps are standing on a common sole, the inner directed inward, the whole thus presenting a fan-like appearance.

This shell is characteristic in its oblong outline, the last whorl expanding at the aperture, the peristome not everted above and only slightly below; the comparatively small, little elevated spire, and the suture which is not as deep as in *V. pulchella.* It also averages a little smaller than this.

V. excentrica is variable only within narrow limits; its size goes very little above and below the average; in many examples, or forms, the outline of shell and umbilicus is less markedly elongate. Some are also more glossy, transparent and shining than others. Frequently the last whorl gradually ascends in front, as shown in fig. 6, a feature often found also in other species, such as in *pulchella*, *costata* and *parvula*; and then the suture becomes deeper toward the aperture. A striking feature in fresh examples, is the white lip shining through the shell.

It is surprising that this species has been overlooked, or rather thrown together with *V. pulchella*, especially in Europe, where it must be mixed with that species in numberless lots in collections, and from which it is distinguished at first glance when once known. In North America evidently Morse (*l. c.*) paid attention to it,

describing it under Say's name *V.* (*Hel.*) *minuta*, as the American form as distinct from the European one, *H. pulchella;* but just as evidently he had the two mixed up before him, and so failed to characterize either of them sufficiently. And moreover, Say's name *minuta* is out of the question, since he himself declared it a synonym *pulchella*.

V. ADELA Westerlund. *Unfigured.*

Openly umbilicated, depressed trochiform or convex, very indistinctly finely striate or smooth, whitish; whorls 4–4½, rather convex, not angular at all at the rather deep suture, rather rapidly increasing, the last comparatively large, rounded, not expanded, not descending in front; aperture crescentic-circular, with margins separate, peristome very narrowly everted or almost straight, and without a lip.

Alt. 1·5–1·75, greater diam. 2·5–3 mill. (*W.*)

Suabian Alps; fossil in a submarine peat-bog *near Ystad in southern Sweden.*

Helix adela West., Ofversigt af K. Vet. Ak. Forh. 1881, 4, p. 37; Fauna der in der Palæarktischen Fauna Lebenden Binnenconchylien, Berlin, 1889.

"Resembles an immature *pulchella*, without everted margin."

I have seen no examples of this. The above description is translated from Westerlund's *Fauna*. Of two specimens labeled Ystad, from the author through Mr. Ponsonby, kindly forwarded by Mr. Pilsbry, one was a *pulchella*, the other *costata*, evidently by a mistake.

V. DECLIVIS Sterki, n. sp. Pl. 32, figs. 10, 11, 12, 13.

Widely and regularly umbilicated, depressed conic, whitish, translucent; surface with very fine, dense, rather regular striæ; nucleus smooth. Whorls 4, gradually increasing, with a rather deep suture; the last well rounded, scarcely predominating, very *gradually descending* in its last third to the periphery of the penultimate or rather below it. Aperture nearly ⅘ crescentic circular, the inferior end of the margin slightly protracted; *peristome not everted*, or very narrowly so at the periphery and base, with a thin but distinct white lip. Alt. 1·4, greater diam. 2·6, lesser 2·2 mill.

Central Europe; in drift on the *Danube river, Bavaria, and Aare river, Switzerland.*

Var. ALTILIS Sterki. Pl. 32, figs. 14, 15, 16, 17.

Differs from the type by its somewhat larger size, more elevated spire, narrower umbilicus, the last whorl descending below the periphery of the penultimate. The aperture is even less oblique and inclined, rather higher than wide, and the peristome quite straight and simple.

Alt. 1·7, greater diam. 2·9, lesser 2·5 mill.

Drift on *Main river, Germany, and Aare river, Switzerland.*

The few examples of this species extant are, though found in drift and dead shells, quite fresh; and it is to be expected that living ones will be found in the localities given.

(2) *Group of V. pollinensis.*

Aperture crescentic circular; surface very finely striated, with more distant, acute, lamelliform, fine ribs.

V. POLLINENSIS Paulucci. *Unfigured.*

Shell with a rather narrow, funnel shaped umbilicus (the same at the aperture little and gradually widened), convex, with obtuse prominent apex, light horn colored, exceedingly finely striate, adorned with more distant, acute, lamelliform, regular, fine ribs; whorls 4½, regularly increasing, convex, with impressed suture, the last gradually [slowly] increasing and not expanded at all at the aperture, rather constricted, scarcely wider than the penultimate, slightly and gradually descending above; aperture little oblique, crescentic-circular, descending [?]; margin straight, simple; only the columellar margin high up somewhat everted.

Alt. 1·5, diam. 2·5 mill. (*Westerl.*)

Italy; Monte Pollina, Prov. Potenza.

Hel. pollinensis PAUL., in WESTERLUND, Fauna, I Suppl., p. 120.

Description translated from Westerlund, *l. c.* Not seen by me.

(3) *Group of V. costata.*

Aperture with margins much approximating, nearly circular or transversely wider, with a more or less strong lip; surface with distinct membranous ribs; nucleus with fine revolving lines.

V. COSTATA Müller. Pl. 32, figs. 18–22, 27; pl. 33, fig. 54.

Moderately umbilicated, more widely so for the last half whorl, *depressed* convex *above*, or nearly flat; grayish to light or reddish

horn colored, with rather regularly set *membranous ribs* and finer striæ between them; nucleus with fine revolving lines. Whorls 3½, slightly flattened above and below the periphery, at the circumference somewhat angular, with a *deep suture*, rather rapidly increasing; the last whorl expanding to the aperture, shortly and moderately *descending in front, more so at the suture* than on the back. Aperture rather oblique and inclined, *almost circular*, a little flattened above, ends of margin much approximating, slightly protracted and auricled, connected by a thin callus; *peristome strongly* and abruptly *everted, with a strong white lip.*

Alt. 1·1, greater diam. 2·5, lesser 2·1 mill.

Circumboreal; Europe, eastern and northern Asia to the Amur; northern Africa; in North America it has about the same range as pulchella, but seems to be not so common.

Hel. costata Muller, Verm. Hist. II, 1774, p. 31,—Rossm., Icon. f. 439; Dupuy, Hist. 1848, p. 162, t. 7, f. 4.—Westerlund, Fauna I, p. 14,—and of other authors.—*Hel.* or *Vall. pulchella* var. *costata* of authors.—*V. rosalia* Risso, 1826.

Jaw rather curved. Radula with 69–72 transverse rows of 27 or 29 teeth; 5 perfect laterals, on which the cusps are comparatively small, especially the ectodonts. On the marginals the 6–7 cusps stand immediately on the plate, not on a common base.

V. costata has, by most authors been regarded as a variety of *pulchella*; but it is sufficiently different to be distinguished at first sight; the less elevated spire, with the deeper suture, the whorls not so well rounded, the last descending in front, the more oblique and more circular aperture with approximate margins, characterize quite a different shell, even if we omit mention of the most conspicuous feature of fresh specimens, the membranous ribs, which this species has in common with a number of other forms of this group and the next. Between each pair of these ribs there are 3 to 6 finer striæ; and under the microscope very fine lines are seen, nearly parallel to the lines of growth at the suture, while on the periphery they are variously intercrossing as shown in fig. 27. The nucleus, or embryonal whorls, bear a number of microscopic revolving lines, in this as well as in the other species of this group.

V. costata is rather variable. The largest measure 2·7, the smallest 2·1 mill. greater diameter. Always the sutural part of the last whorl descends more to the aperture than the back or peripheral part of the whorl, and sometimes the latter keeps exactly in the

horizontal direction to the very margin of the lip. The number of ribs was found to be from 23–35 in the type. Some forms differ so much that they are to be considered varieties:

Var. HELVETICA Sterki, n. v.

Small; glossy, transparent, colorless; shining, without membranous ribs, in their place fine striæ being visible, more from their white color than from being prominent. Umbilicus rather regularly spiral. Greater diam. 2·2 mill. A very peculiar and beautiful form.

Jura Mts. near Brugg, Switzerland, and in drift on *Aare river*, in company of typical *V. costata*.

Var. AMURENSIS Sterki, n. v. Pl. 33, figs. 50, 51, 52.

Small; spire nearly flat; deep horn colored; ribs strong and distant, about 22 on the last whorl, the back of which is very little or not at all deflected in front. Umbilicus rather regular, wide, perspective from the first volutions. Greater diam. 2·2 mill.

Kassakewitsch, on the Amur.

Var. PYRENAICA Sterki, n. v.

Large; umbilicus wide, perspective; whorls 4, more gradually increasing than in the type, the last less expanding to the aperture; ribs small. There is an obtuse angle in the circumference-outline about one-fifth of a volution behind the aperture.

Greater diam. 2·6–2·8 mill.

Pyrenees (in a lot with typical *costata*.)

Var. MONTANA Sterki, n. v.

Rather small; rather thick, colorless, translucent, spire more elevated very low conic; surface with rather crowded rib-striæ, not membranous. Last whorl gradually ascending to the aperture, then the suture descending; lip very thick.

Rocky Mts.

Possibly these varieties will have to be ranged elsewhere when more and fresh specimens come to hand.

V. PARVULA Sterki, n. sp. Pl. 32, figs. 23, 24, 25, 26.

Widely umbilicated, *quite flat above*, or with little prominent apex, thin, horn colored, with rather *fine, dense membranous ribs*, and finer striæ between them; nucleus with microscopic revolving lines. Whorls a little over 3, slightly flattened above and below the periphery, with a deep suture, the last comparatively wide, rather

rapidly *expanding to the aperture, descending only at the suture* in front. Aperture very oblique, tangental, and rather inclined, *almost circular*, with ends of margins somewhat protracted; *peristome straight above, abruptly everted below, with a strong, whitish lip.*

Alt. 0·8, greater diam. 2·0, lesser 1·6 mill.

Central part of North America; Illinois, Iowa, Nebraska, Kansas, Indian Territory.

This species closely resembles in shape *V. costata*, with which it is found, but it is constantly much smaller, having only half the bulk of the latter, and differs also in the wider umbilicus, the flat spire, the last whorl not being decurved at all on its back, but quite straight to the margin, or quite commonly ascending (like some specimens of *V. excentrica*, fig. 6, pl. 32); the ribs stand more densely, as a rule, than in *V. costata*. It resembles also *V. perspectiva*, q. v.

V. TENERA Reinhard. Pl. 43, figs. 64, 65, 66.

Rather widely and regularly umbilicated, with little elevated spire, the apex prominent. *Light grayish horn colored*, translucent; with with fine and dense membranous ribs. Whorls rather more than 3½, regularly increasing, a little angular at the periphery, with a deep suture, the last moderately wide, distinctly *flattened above and sloping outward*, somewhat expanding toward the aperture, ascending and then moderately *descending in front*, a little more so at the suture. Aperture very oblique and inclined, transversely elongated, *markedly flattened above*, moderately curved below, margins much approximating, the superior more advancing in front; peristome, except above, moderately and abruptly everted, with a rather *thin, almost glassy transparent lip.*

Alt. ·1, greater diam. 2·3, lesser 1·9 mill.

China (Shanghai) and Japan (Kobi, Nippon.)

Hel. tenera REINHARD, Jahrb. D. Mal. Ges. 1877, p. 322, t. xi, fig. 4.

General aspect of *costata*, but the last whorl and aperture distinctly flattened above. The dense fine ribs (38–43 on the last whorl), the grayish tint, distinguish it sufficiently from that species and from *V. parvula*.

V. pulchellula Heude (*Helix pulchellula* Hde., Notes sur les Moll. Terr. Vallée Fl. Bleu, p. 20, t. 13, f. 17) is not superficially distinct from *tenera*. Among two different and evidently authentic

lots from *China* and *Shanghai, China*, of 3, and 2 specimens respectively, one of each was the same as the *tenera* from Japan, while the others were a trifle smaller, with a narrower umbilicus widened at the opening, somewhat more elevated spire and of a more yellowish horn color. The form is represented in pl. 33, fig. 53. It is possible, consequently, that they represent a var. *pulchellula* Hde., but for want of sufficient material, decision is better deferred.

V. GRACILICOSTA Reinhard. Pl. 33, figs. 48, 49.

Shell flat, with little prominent apex, widely umbilicated, whitish-gray in color. Whorls 3½, convex, separated by a deep suture, with fine but distinct, rather crowded ribs; the last whorl slightly angular around the umbilicus, strongly expanding toward the aperture, slightly descending to the same. Aperture moderately oblique, transversely oval, with strongly everted and broadly white-lipped peristome; upper margin but little, lower margin more curved, almost obtusely angular. Margins at the insertions approximating and connected by a callus. Alt. *ca.* ·1, greater diam. 2·5, lesser 2·0 mill. (Original description, translated.)

On the Little Missouri river collected by MM. Krause.

V. gracilicosta REINH., Sitzungsber. Naturf. Freunde Berlin, 1883, p. 42.

I have seen no authentic examples of this species, but think four specimens from Logan Canyon, Utah, may range under it, and also a few other examples from Quebec, Canada, which I observed living and examined jaw and radula. In all of them, and also in the fossils to be mentioned below, the last whorl ascends slightly and gradually but distinctly, before it descends to the aperture. They are somewhat larger than given in the description. Greater diam. 2·6–2·8 mill. The ribs of the shell itself are rather strong, sharp and crowded, about 55 on the last whorl), but regular, with small, fine membranous appendages.

The jaw is large, of a pale horn color, thin, with rather crowded; strong, irregular rib-striæ. The radula is also comparatively large, each transverse row with 33–35 teeth, and 6 laterals, on which the cusps, and especially the ectodonts are larger than in *V. costata*. As to the shell, this species stands doubtless near *costata;* yet it shows relations to those of the following group, in the formation of the aperture, the ascending and descending of the last whorl and the fine, crowded ribs.

To this species I also refer some quaternary fossils collected by the Texas Geological Survey, in a Dry Salt Lake near Eddy, Southern New Mexico, and two specimens found in Osborn's Julia Canyon, N. W. Texas, at either place in company with a number of small land and fresh-water mollusca embedded in a fine quartz sand.

Whether these mollusca, which evidently range under the same head, are really identical with the *V. gracilicosta* of Reinhard, I am unable to decide at present, but from the description, believe so.

V. PATENS Reinhard. *Unfigured.*

Shell small, flat, with scarcely projecting apex, with very wide perspective umbilicus; grayish-white. Whorls 3½, somewhat depressed, moderately increasing in width, separated by a deeply impressed suture, and with distant membranous ribs; the last scarcely descending toward the aperture. Aperture very oblique, transversely oval, with everted but scarcely thickened peristome; upper margin almost straight, lower margin symmetrically curved, insertions of the margins approximate. Diam. 2, alt. scarcely 1 mill.

V. patens REINH., Sitzungsber. Naturf. Fr. Berlin, 1883, p. 43.

This species reminds one of *H. costata* as to the ribs, but differs from it by its smaller size, wider umbilicus and more oblique aperture, with slightly thickened peristome. It has been found, by Dr. O. v. Moellendorff, on the *Powantschan, Prov. Chili, China,* in company of *H. tenuilabris* A. Br., a species which seems to be widely distributed in northeastern Asia, while in Central Europe it is only found fossil in the pleistocene loess. This fact corresponds in an interesting way with the results of Nehring's investigations upon the vertebrate fauna of the loess. The original description is translated above.

(4) *Group of V. cyclophorella* Anc.

Aperture with margins approximate, transversely ovoid or pear shaped, without (or with a thin) lip; surface densely striate or ribbed; last whorl ascending before descending in front.

V. PERSPECTIVA Sterki, n. sp. Pl. 33, figs. 39, 40, 41, 42, 43, 44, 45

Shell *very widely, perspectively umbilicated, flat* or little elevated *above;* pale horn color or colorless, thin, translucent, with rather dense, rather regular, moderately strong membranous ribs, and finer striæ between them; nucleus without revolving lines (?). Whorls 3½, gradually increasing, a little flattened below the periphery, with

a deep suture; the last comparatively narrow, little expanding toward the aperture, *descending in front.* Aperture very oblique and inclined, transversely, short ovoid or oblong; *peristome solute, continuous*, shortly everted, except near the suture, *without a lip.*

Alt. 0·7, greater diam. 2·0, lesser 1·7 mill.

Knoxville, Tennessee; Jackson Co., Alabama; Iowa (drift on Missouri river.)

Jaw slightly arcuate with fine, irregular ribs slightly denticulating the cutting edge. Radula with 77 transverse rows of 25 teeth; of the 5 laterals the fifth has a small, though distinct, plate and the ectodont double pointed; on the sixth, or first marginal, the outer cusps are only 2–3, comparatively large.

The free, continuous peristome (see fig. 45) is a character distinguishing our species from all others known to me. In general the aperture is not as conspicuously elongated transversely as in other related forms, and the inner part in some examples is at least as well rounded as the outer, or even more (fig. 44). There are about 35 ribs on the last whorl, as there are also in *V. parvula*, which the present species resembles in size and general appearance; but the wider umbilicus, the transversely elongated aperture, continuous peristome, the absence of a strong lip, and the last whorl descending in front, are sufficient to distinguish the form under consideration. From its small size, coloration and the ribs, *V. perspectiva* forms a remarkable contrast to the other large species of the group, with which it is yet connected by the configuration of the apertural parts. It might just as well be placed in a separate group.

V. TENUILABRIS A. Br. *Type unfigured.*

Shell with umbilicus open and rapidly widening at the aperture, depressed convex, with prominent almost papilliform apex, with fine and acute crowded ribs; grayish horn colored. Whorls 4–4½, somewhat convex, the last somewhat expanding in front, gradually deeply descending; suture rather impressed. Aperture very oblique, little crescentic, transversely oval-rounded with margins much approximate, peristome everted [widened], thinly lipped, yellowish horn colored, inferior margin reflected.

Alt. 1·7–2, diam. 3 mill. (*Braun.*)

Siberia; Jarzowa, Selo, at 60° 10′, *and Werschininsky*, 58° 55′; *fossil in southern Germany.*

Hel. tenuilabris WESTERLUND, Vers. D. Naturf. Main, 1843, p. 143; id. Fauna I, p. 15.—SANDBERGER, Conch. der Vorvelt, p. 841, t. 36, f. 16.

Var. SAXONIANA Sterki. Pl. 33, figs. 30, 31, 32, 33.

I have seen no recent Asiatic specimens of the above. A fossil form from Krsellwitz near Halle, A. S., Saxony, has been sent out as *tenuilabris*, and is represented in figs. 30–33. The specimens are remarkably well preserved, more or less transparent, with the epiconch preserved, and differs in some particulars from the above description; umbilicus at first rather narrow, (narrower than drawn in fig. 31) surface rather finely and densely striate, hardly to be described as ribbed: peristome entirely without a lip; the last whorl is distinctly ascending before descending in front (figs. 33, 32): there is also no trace of a difference in color of the apertural part and the balance of the shell.

Alt. 1·7, greater diam. 3·1–3·3, lesser 2·4–2·6 mill.

From this, it becomes evident that the two forms are different; and the Krsellwitz shell requires a name; yet for obvious reasons it is preferable to range it as a variety under *V. tenuilabris*.

V. CYCLOPHORELLA Ancey, n. sp. Pl. 33, figs. 34–38; pl. 32, fig. 29.

Shell rather widely umbilicated, more widely so for the last half whorl, depressed convex above, *grayish horn colored*, translucent, with small, crowded ribs bearing small membranes; nucleus with indistinct revolving lines. Whorls 4, gradually increasing, with a moderately deep suture, the last somewhat widening, *distinctly ascending before descending* in front. Aperture very oblique, *transversely oval*, with margins much approximating; peristome somewhat everted at the periphery and below, thin, *without a lip*.

The ribs are comparatively very fine, about 60 on the last whorl, and somewhat irregular (fig. 29.)

Rocky Mts.; Colorado, Utah, Washington.

V. cyclophorella ANCEY, *MS.*

Jaw rather narrow (short), truncated at the ends, with rather stout, irregular ribs, except near the ends. Radula with 63 transverse rows of 25 teeth; 5 laterals; on the first 2·3 marginals the mesodont is little longer than the other cusps, on the following teeth of the same size.

V. MINONECTON Boettger. Pl. 43, figs. 67, 68, 69.

Smaller [than *tenuilabris*], more depressed, almost regularly, very finely rib-striate; whorls only 3, the last, as also the superior margin of the peristome somewhat angular above; size 2¾–2½ : 1¼ mill. (*Boettger.*)

(*Transcaucasia, on the summit of the Agh-dagh in the Kspet-dagh* at 9-10,000′

Hel. adela West. var. *mionecton* BOETTGER, Zool. Jahrb. IV, 1889, t. 27, fig. 11.

Westerlund (Fauna, I Suppl., p. 120) refers this form to *V. tenuilabris*, as a variety. Boettger evidently later regards it as a distinct species.

Var. SHAMHALENSIS Rosen.

Differs from the type by the shell being polished, not rib-striate. (*Rosen*, Nachr.-Bl. D. Mal. Ges., 1892, p. 123.)

Shamhala, Prov. Chorassan, Persia.

I have seen no specimens.

V. LADACENSIS Nevill. Pl. 56, figs. 19, 20, 21.

Shell depressed, broadly and perspectively umbilicated so that all the whorls are visible from below; densely costulate, the riblets sometimes almost obsolete; thin, gray-white; spire little projecting; whorls 3½, slightly convex, the last rounded, distinctly descending in front. Aperture very oblique, transversely piriform, the peristome expanded, rather thin, margins approximating, the upper moderately, lower more arcuate.

Alt. 1½, greater diam. 3½, lesser 2½ mill.; aperture diam. 1¼, oblique alt. 1 mill. (*Martens.*)

Central Asia, near Iskardo in Thibet; northern foot of the Tian-shan Mts.; Mataian and Leh, Ladak region.

Helix (*V.*) *ladacensis* NEV., Scient. Res. of the second Yarkand Miss., Moll., p. 4.—MTS., Centralasiat. Moll. 1882, p. 3, t. 3, f. 3.—WESTERLUND, Fauna I, p. 15.

I have not seen this form.

V. ASIATICA Nevill. *Unfigured.*

This is probably the variety recorded by von Martens from Turkestan, measuring 3 mill. in diam., 1½ in height; it differs from the typical European form by its larger size and slightly stronger subangulation at base, near the umbilicus. More than a hundred

and fifty specimens were collected by Dr. Stoliczka, all of approximately the same size, at Pasrobat, Sásak Taka and Wakhan; one of the specimens from the last locality I have taken as my type of var. *asiatica*. (*Nevill.*)

Central Asia (Nev.); *Pyramid Id., Alaska* (Krause.)

Hel. (*Vallonia*) *costata* var. *asiatica* Nev., Sci. Results of the Second Yarkand Miss., p. 4.—*Vallonia ladacensis* var. *asiatica* Nev. Reinhard, Sitzungsber. Ges. Naturf. Freunde, Berlin, 1883, p. 42.

Not seen by me. It needs revision, as to the identity of the Central-Asiatic and Alaskan forms, and also as to its specific relationship with *ladacensis*, *tenera*, etc.

Genus SOLAROPSIS Beck.

Helix catenulata Ancey. Unfigured Bull. Soc. Mal. Fr. vii, p. 151. Cayenne. Belongs to the group of *andicola*, *catenifera*, etc.

Genus DORCASIA Gray.

Dorcasia Gray in Pfr., Zeitschr. f. Mal., June, 1845, p. 87; Monogr. i, p. 332, type *H. alexandri* (Gray) Pfr.—*Galaxias* (pt.) Beck, Index, p. 42, 1837, (*H. globulus*, *rosacea*, etc.), preoc.

These South African snails have hitherto been mingled with the East Asian *Eulota* or *Acusta* species, but their affinities are hardly with that group. The jaw is of the aulacognath type. The genitalia are unknown, but the digestive tract has been figured in Ber. d. Senckenb. Naturf. Ges. 1886, pl. 1, f. 2. Boettger has expressed the opinion that *H. alexandri* and its allies may prove to be carnivorous forms allied to *Streptaxis* (*l. c.*, p. 22.)

D. alexandri (Gray) Pfr., var. minor Bttg. Pl. 28, figs. 98, 99, 100.

Shell much smaller than the type; whorls 4½, instead of 4¾; the last a little subangulated at the periphery. Alt. 10–11½, diam. 21–24 mill.; aperture, alt. 10–10½, width 11–12 mill. Ratio of alt. to diam. 1 : 2,06 (five specimens measured); the ratio in the typical *alexandri* being 1 : 2,29. (Ber. d. Senck. Naturf. Ges. 1886, p. 22.)

Southern part of the Kalahari Desert.

Var. rotundata Mousson.

Shell smaller than the type, less depressed; spire more produced. Whorls 5, the last rounded, less deviating at the umbilical rimation than in the type; rib-striæ visible beneath.

Alt. 15–16, diam. 22–25 mill. (*Mouss.*, in Journ. Conch. 1887, p. 292.)

Rehoboth, northern Great-Namaland.

D. NAMAQUENSIS Melvill & Ponsonby. Pl. 28, fig. 1.

Shell slightly umbilicated, globose, the surface very minutely longitudinally wrinkle-striate, scarcely shining, brownish flesh colored, thin. Whorls 5, the last inflated, rotund, submalleated at the lip; columella smooth, whitish. Aperture ovate; peristome reflexed, whitish, the columellar margin callous, subdilated; umbilicus covered. Alt. 30, diam. 27 mill. (*M. & P.*)

Namaqualand, S. Africa.

Helix (*Dorcasia*) *namaquensis* M. & P., Ann. Mag. Nat. Hist. (6), viii, p. 237 (Sept., 1891); *l. c.*, 1892, t. 4, f. 12.

D. PORPHYROSTOMA Melvill & Ponsonby. Pl. 28, fig. 3.

Shell covered umbilicate, conic-pyramidal, ample, longitudinally rugose-striate, pale ashy-white, rather solid. Whorls 5, subconvex, the last rounded. Aperture ovate, purple within; peristome reflexed, purple, the columella smooth.

Alt. 43, diam. 38 mill. (*M. & P.*)

Namaqualand, S. Africa.

Helix (*Dorcasia*) *porphyrostoma* M. & P., Ann. Mag. N. H. (6), viii, p. 238 (Sept., 1891); ix, t. 4, f. 11.

This very fine species is near the well-known *H. globulus* Müll., from which, however, and all near allies, it differs in the conically pyramidal shape, the whorls being gradually attenuate toward the apex. There is no sign of malleation, so conspicuous a feature in *H. globulus* and *rosacea* in all their forms; and, lastly, the outer lip is more simple, being not so conspicuously reflected, nor is the deposit of purple enamel both on the outer and columellar lips so rich in either substance or color. Two specimens, both precisely similar. There are also unnamed examples in the National Collection. (*M. & P.*)

D. GYPSINA Melvill & Ponsonby. Pl. 28, fig. 2.

Shell covered umbilicate, globulose-conic, thick, longitudinally rugose-striate, chalky-whitish, little shining. Whorls 5, the last whorl compactly rounded. Aperture depressed-oval, whitish within; peristome reflexed, white, the columellar margin smooth, white.

Alt. 24, breadth 20 mill. (*M. & P.*)

Springbok, S. Africa.

Helix (*Doreasia*) *gypsina* M. & P., Ann. Mag. N. H. (6), viii, p. 238 (Sept., 1891); ix, t. 4, f. 10.

We consider this sufficiently to differ from *H. namaquensis*, the shell being of decidedly less delicate substance, more compact, and of a chalky whiteness; the mouth less effuse and distinctly ovate-depressed at the base. It is also considerably smaller; nor is the slight malleation, so noticeable in the last whorl of that species, to be found in *H. gypsina*. (*M. & P.*)

Unfigured species.

HELIX COAGULUM Martens, Sitzungs-Bericht Ges. Naturf. Freunde zu Berlin, 1889, p. 160. Great Namaland. Near *H. globulus*.

HELIX CERNUA Martens, *l. c.*, p. 161. Great Namaland. Allied to *lucana*, *kraussi* and *alexandri*.

Genus CARACOLUS Montfort. (Vol. V, p. 75.)

Section LUCERNA Swains. (Vol. V, p. 97.)

C. SLOANEANA var. VENDRYESI Cockerell. Vol. IX, pl. 25, figs. 6, 7.

Shell more depressed than usual, and distinctly, rather acutely carinated. Color dark purple-brown, blackish on the spire, the lip lighter. Alt. 13, diam. 27 mill.

Montego Bay, Jamaica.

Helix (*Lucerna*) *vendryesi* CKLL., Journal of the Institute of Jamaica i, p. 55 (Feb., 1892.)

This form differs from depressed specimens of *sloaneana* only in the somewhat more acute carina and the much darker color. My figures are from one of the original lot, several of which were kindly sent me by Mr. Cockerell.

Section LABYRINTHUS Beck (Vol. V, p. 159.)

C. SIEVERSI Martens. Vol. IX, pl. 25, figs. 7, 8.

Shell *covered perforate*, globose-conoid, solid, minutely granulated, unicolored. Spire wide-conoidal, rather obtuse. Whorls 5, slightly convex, slowly increasing, the last *rounded*, deflexed in front, strangulated and scrobiculate. Aperture very oblique, ear-shaped; peristome somewhat thickened, reflexed, the margins joined by a distinct *appressed* callus; right margin deeply curved, 2-toothed, basal margin with two denticles.

Alt. 12½, greater diam. 19½, lesser 16½ mill.

Sierra Nevada de S. Marta, New Granada.

Helix sieversi MARTENS, Conchol. Mittheil. iii, p. 7, t. 41, f. 5, 6, (1889.)

The single specimen before me is much bleached, and shows only that no strong color-markings were present. The color of fresh examples is evidently dark violet-brown. It differs from *H. isodon*, which also lives in New Granada, in having the umbilicus closed all but a minute crack, by the thick deposit from the peristome, in the two pretty equal teeth of the basal margin, and the convex, not carinated body-whorl. (*Mts.*)

C. UNCIGERA Petit, var. CREVEAUXIANA Ancey.

Shell always larger than *uncigera* (alt. 13, greater diam. 38, lesser 35 mill.), *unicolored chestnut*, the aperture much more solute; parietal fold hardly straight, but contorted; basal hook narrow, strong; peristome white, etc. (*Anc.*, Bull. Soc. Mal. Fr. viii, p. 152.)

Frontino, Western Columbia.

This is considered a distinct species by Ancey. The specimen before me measures 34 mill. diam. This is the variety described in Vol. V, p. 165, and figured by Dohrn in the Conchyl. Cab., pl. 181, figs. 10, 11, 12.

The following are scarcely more than individual mutations: *conoidea* Anc., Like typical *uncigera*, but spire more elevated, conoidal. *Anopla* Anc., Basal fold obtuse, not hooked, otherwise like the type.

Section THELIDOMUS Swains.

Page 65, line 15, for "*periphery*" substitute *peristome*.

Section PARTHENA Alb.

Page 73. The name "*H. cornumilitare*" should be dropped, and *H. gigantea* substituted. Crosse holds that *H. audebardi* is a distinct species from *gigantea*.

Section CEPOLIS Montf.

Page 95. *H. pimesoma* is a synonym of *H. trizonaloides* Brn. The dimensions of the latter are erroneously stated in my text.

Genus CAMÆNA (Alb.) Pils. & Mlldff. (Vol. VI, p. 197.)

Camœna Pils., Proc. Acad. Nat. Sci. Phila. 1892, p. 398.

(*Typical group.*)

C. PACHYCHILA (Smith.) Pl. 52, figs. 50, 51, 52.

Shell large, umbilicated, thick lens-shaped, solid, carinated at the periphery. Ground color light yellow, becoming darker and reddish-brown on the spire; the last two whorls adorned with many narrow dark red-brown spiral lines, a more intense line bordering the keel below.

The surface is densely granulated above and below, and on the last whorl it is malleated in places. Embryonal whorls 2¼, shining, convex, arcuately plicate-striate; measuring about one-seventh the diameter of the mature shell. The junction of embryonal shell with the after-growth is distinctly marked; the latter being sculptured with microscopic spiral lines and granules, and being flatter, wider, and on account of the acute carination the suture appears slightly margined above. Post-embryonic whorls 3, but little convex, separated by superficial sutures. The last whorl is acutely carinated, the carina becoming obsolete on the latter third of the volution, and not modifying the rounded contour of the outer lip; base convex, curving rapidly into the large, cylindrical umbilicus, which is banded inside.

Aperture oblique, lunate-oval, purplish-white within, and showing the external color-bands as purple lines which continue to the edge of the lip. Peristome well expanded above and outwardly, broadly reflexed below, its face convex; columellar insertion broadly dilated, concealing a small part of the umbilicus.

Alt. 30, greatest diam. 55, lesser 44 mill.

Annam.

Helix pachychilus E. A. Smith, *MS.*

This species is allied to *C. ochthoplax* and *saturnia*, and more to *C. leonhardti*. From the former it differs in the distinctly granulated sculpture and somewhat in the coloration, which resembles *C. hainanensis, longsonensis*, etc.

C. LONGSONENSIS Morlet. Pl. 29, figs. 88, 89.

Shell subperforated, discoidal, depressed, thin, covered with a buff epidermis; ornamented with growth-striæ and rough, oblique, irreg-

ular, delicate spiral striæ. Spire obtuse, whorls 5½, slightly convex, separated by a linear suture; the first whorl unicolored buffish, the last begirt with narrow, unequally spaced brown lines. Last whorl acutely carinated at the periphery, brown, having about 12 unequally spaced brown lines. Aperture not descending, rhomboidal, transverse. Columella white, the columellar callus almost entirely closing the umbilicus; lip reflexed, whitish, angulate.

Alt. 20, greater diam. 40, lesser 33 mill. (*Morlet.*)

Long-son, Tonquin.

Helix longsonensis MORLET, Journ. Conch. 1891, p. 26; *H.* (*Hadra*) *longsonensis* MORLET, ibid., p. 244, 248, t. 5, f. 3.

Smaller and thinner than the preceding, and having the umbilicus almost closed.

(Section *Phœnicobius* Mörch, 1852.)

Phœnicobius MORCH, Catal. Yoldi, p. 32 (genus of Pupidæ).—MARTENS, in ALB., Die Hel., p. 177, 1860 (section of Cochlostyla).—PFR.-CLESS., Nomencl. Hel. Viv., p. 210, 1878 (section of Cochlostyla).—MOLLENDORFF, Nachrichtsbl D. M. Ges. 1891, p. 202 (subgenus of Camæna.)

Shell like Camæna in the large embryonal portion, consisting of about 2¾ whorls; differing from Camæna in being generally more elevated, sometimes pupiform, and in having (typically) four dark spiral bands. Type *H. arata* Sowb.

To Dr. O. von Mollendorff belongs the credit of first announcing the fact that this group belongs to Camæna, instead of to *Cochlostyla*, where previous authors had placed it. The fact is, that the species of this section are very closely allied to the Philippine species *traillii*, *monochroa*, etc., and if the section *Phœnicobius* be retained, it must be enlarged to include these forms.

Those who have had occasion to study large series of Oriental Helices are aware that the system of banding is quite different from that of the true *Helix* of Europe. The band-formula originated by Martens *pro* for the latter is quite inapplicable to the genera Hadra, Camæna, etc. The patterns are evidently of independent origin, having been evolved since the divergence of the principal Helicoid stocks.

Now in *Camæna* the bands are as follows: i, sutural; ii, supra-peripheral; iii, infra-peripheral; iv, umbilical. The bands ii and

iii are usually separated by a distinct light peripheral zone, and band iv is generally bounded by a basal light zone. Band ii is generally narrow and dark, immediately above the periphery, but it is sometimes widened, and in *C. trailli* it is split into two. Most species of the Philippine Island group of *Camæna* (including *Phœnicobius* and *Pseudobba*) possess all four bands; but in some, such as *C. mamilla*, the umbilical patch is wanting. In the Indo-Chinese group of species, bands i and iv are wanting; band ii only being retained in *hainanensis*, *illustris*, *xanthoderma*, etc., and band iii in *cicatricosa*, *pachychila*, etc. Besides these, numerous narrow lines are developed in some species.

The general system of banding in *Hadra* is similar to that of *Camæna*. See *Manual*, vol. VI, p. 129, 149.

C. ARATA Sowerby. Pl. 18, figs. 2, 3, 4, 5.

Shell pupiform, elevated, narrowly umbilicated, solid, rich chestnut-brown, becoming lighter or yellowish on the spire, but retaining a brown band above the suture; the body-whorl generally showing a light peripheral girdle, with sometimes another around the umbilicus. Surface sculptured with strong unequal and irregularly spaced oblique riblets.

Spire convex-conic; whorls 6½, the last descending in front. Aperture oblique, truncate-rounded, pinkish-white within; peristome widely expanded, dark chestnut colored. Columella with a white tract at its insertion.

Alt. 44, diam. 28 mill.

Alt. 30, diam. 24 mill.

~~*Tablas*~~, *Philippine Is.*

Helix (*Helicostyla?*) *arata* SOWB., P. Z. S. 1840, p. 89.—REEVE, Conch. Icon., t. 15, f. 59.—*Bulimus aratus* PFR., Conchyl. Cab. Bul. p. 204, t. 57, f. 10; Monogr. ii, p. 77.—*Pupa* (*Phœnicobius*) *arata* MORCH, Catal. Yoldi, p. 33.

Differs from the closely allied *C. brachyodon* in the strongly developed folds of the surface.

Color-var. *lutea* (pl. 18, fig. 5). Shell unicolored light buff; entire lip pure white.

C. BRACHYODON Sowerby. Pl. 18, fig. 1.

Shell globose-turbinate, narrowly umbilicated, solid, dark reddish-chestnut, fading to brown on the spire, and having a narrow light peripheral girdle and a wider yellow circum-umbilical band. Sur-

face irregularly marked with wrinkles of growth. Spire convex-conoidal, composed of 5½, convex whorls; the last well rounded, somewhat descending in front. Aperture oblique, fleshy-white within, the columella white, more or less truncated below; peristome dark brown, well expanded in every part, the basal lip bearing an elongated white denticle in the middle, sometimes obsolete.

Alt. 40, diam. 34 mill.

Alt. 33, diam. 32 mill.

Mindoro, Philippine Is.

Helix (*Helicostyla*) *brachyodon* Sowb., P. Z. S. 1840, p. 89.—Reeve, Conch. Icon., f. 79.—*Bulimus brachyodon* Pfr., Symb. ii, p. 43; Conchyl. Cab., p. 203, t. 57, f. 8, 9; Monogr. ii, p. 77.—Desh. in Fér., Hist., t. 108B, f. 3, 4.

The typical brachyodon is far smoother than *C. ovata*, and is more globose in contour. The columellar truncation and basal tooth are also valuable differential characters, when developed.

Var. naujanica Hidalgo. Pl. 18, figs. 6, 7.

More elongated than typical brachyodon, darker in color, and *much malleated on the last whorl*; lip blackish, toothless; umbilical patch blackish.

Alt. 44–46, diam. 30–32 mill.

Naujan, Island of Mindoro, Philippines.

Bulimus brachyodon var.? Morch, Cat. Kierulf, t. 1, f. 4.—*Cochylostyla naujanica* Hid., Journ. de Conch. 1887, p. 171; 1888, t. 4. f. 1; Obras Mal. i, p. 33, 34.—*Cf.* Mlldff., Nachr. D. M. G. 1888, p. 74.

C. adusta Sowerby. Pl. 18, figs. 8, 9.

Shell cylindrical, elongated, narrowly umbilicated, solid, smooth. Tawny-brown, becoming lighter on the spire, but retaining a dark band above the sutures. Whorls 6½, the last descending in front. Aperture small, oblique, the peristome widely expanded, reflexed, dark brown. Columella light, truncated below.

Alt. 40, diam. 22 mill.

Mindoro, Philippines.

Helix (*Helicostyla?*) *adusta* Sowb., P. Z. S. 1840, p. 89.—Reeve, Conch. Icon. Helix, t. 19, f. 77.—*Bulimus adustus* Pfr., Conchyl. Cab., p. 204, t. 57, f. 11.—Desh. in Fér., Hist., t. 108B, f. 13, 14.—*Cochlostyla adusta* Auct.

More elongated and slender than *C. brachyodon*, and lacking the basal tooth. Some specimens of *C. arata* approach *adusta* in shape, but they are more coarsely sculptured.

C. OBLONGA Sowerby. Pl. 18, figs. 10, 11, 12.

Shell perforated, oblong, subcylindrical, thin, brownish, subrugose. Spire more or less elongated, the apex rather obtuse. Whorls 5½–6, convex, the last much shorter than the spire. Aperture subvertical, oblong-oval, livid inside; peristome expanded, subreflexed, the columellar margin broadly dilated, nearly closing the umbilicus.

Alt. 37, diam. 18 mill.; aperture, alt. 13, breadth 8 mill., measured inside. (*Pfr.*, from Cumingian specimen.)

~~*Island of Luban*~~, *Philippines.*

Helix oblonga SOWERBY, P. Z. S. 1841, p. 40.—REEVE, Conch. Icon., t. 23, f. 99.—*Bulimus oblongus* PFR., Symb. ii, p. 119 (not *B. oblongus* Muller).—*Bulimus lubanicus* PFR., Symb. iii, p. 55; Monogr. ii, p. 78; Conchyl. Cab., Bul., p. 111, t. 34, f. 9, 10.

Seems to resemble *C. adusta* closely; not seen by me. The locality requires confirmation.

C. OOMORPHA Sowerby. Pl. 6, figs. 29, 30.

Shell pupiform, umbilicated, solid. Buff, with two broad reddish-chestnut bands on the body-whorl, with an umbilical patch of the same color, and a narrow band bordering the suture below, and ascending the light colored spire. Whorls 5–5½, convex, the last rounded, finely malleated throughout. Aperture slightly oblique, oval-truncated; lip reflexed, white.

Alt. 24–26, diam. 18 mill.

~~*Tablas*~~, *Philippines.*

Helix oomorpha SOWB., P. Z. S. 1840, p. 103.—REEVE, Conch. Icon., t. 23, f. 98.—*Bulimus oomorphus* PFR., Symb. ii, p. 119; Conchyl. Cab., p. 205, t. 57, f. 6, 7; Monogr. ii, p. 78.

Smaller than the other species, and egg-shaped.

(Section *Pseudobba* Mlldff.)

C. TIRMANIANA Ancey. *Unfigured.*

This is a large form (alt. 29, diam. 44 mill.) closely allied to *C. mamilla*. (*Obba tirmaniana* ANC., Bull. Soc. Mal. Fr. vii, p. 146.)

Sangir Is.

Genus OBBA Beck (Vol. VI, p. 211.)

Obba Beck, Index, as restricted by Gray, P. Z. S. 1847, p. 172.

In vol. VI of this work, the writer adopted the *Helix mamilla* as the type of *Obba*, following von Martens. This was done in ignorance of the fact that in 1847 Gray had selected the first species enumerated by Beck, *H. planulata*, as the type of the genus. It is obvious, therefore, that this species must remain the type, notwithstanding Martens' subsequent selection. The name *Obbina* Semper falls as a synonym, together with the undefined and twice preoccupied term *Gallina* Hartm., proposed for *H. rota*.

The Papuan species *oxystoma* Smith, *berani* Braz., *elisus* Hedley, *pelechystoma* Canefri, *carinata* Hombr., are intermediate between *Papuina* and *Obba* in shell characters. Until the anatomy is known, we will not be able to finally classify them generically.

Obba gallinula Pfr. (Vol. VI, p. 219.)

Var. *morongensis* Mlldff. Shell smaller, more narrowly umbilicated, the whorls more convex; last whorl swollen below, begirt above and below the carina with a wider band, the bands regularly lacerated, variegated with yellowish; rest of the shell unicolored yellow. Alt. 8½–9, diam. 21–27 mill. (*Mlldff.*, Nachr.-Bl. 1889, p. 103.)

Mts. of Morong, Luzon.

Genus CHLORITIS Beck.

Chloritis Pilsbry, Manual vi, p. 242.—Mlldff., P. Z. S. 1891, p. 335, 336.

The most useful shell character of this genus is the *regular arrangement of granules or hair-points on the apical whorl*, which is moreover flattened or sunken, the whole spire often being sunken. This regular arrangement of granules sometimes persists upon the body-whorl, but its regularity is frequently lost upon the later whorls. The criterion established by v. Möllendorff (*l. c.*) cannot therefore be sustained when large numbers of species are examined. Many *Chloritis* have no quincuncial arrangement of granules or hairs on the body-whorl. Möllendorff's section *Parculota* is probably a synonym of *Austrochloritis;* at all events no diagnostic characters separating it have been given. The lack of accessory glands upon the vagina sunder this genus widely from *Eulota*, which has, moreover, a smooth apex, even when the adult is hirsute.

C. CRASSULA Philippi. Pl. 51, figs. 31, 32, 33.

Described in vol. III, p. 211 as a *Dorcasia*. *Cf.* Bttg., Ber. Senck. Nat. Ges. 1890, p. 145, pl. 5, f. 7, and 1891, p. 244.

HELIX (CHLORITIS) DELPHAX Dohrn, *MSS.*, Kobelt, Nachr.-Bl. 1891, p. 204.

Astrolabe Bay, New Guinea.

Allied to *dinodeomorpha* and *erinaceus*.

Section *Austrochloritis* Pilsbry.

C. PSEUDOPRUNUM Pilsbry. Pl. 55, figs. 13, 14, 15.

Umbilicate, globose-depressed, the spire low-conic; rather thin but solid; of a uniform light brown tint; surface nearly lusterless above, somewhat shining below the periphery; seen under a lens it shows very minute close granules, which cover every part; on the apex and earlier whorls these points are arranged in oblique lines, but on the last whorl such arrangement is scarcely traceable.

Whorls 5½; apex somewhat obtuse, its tip a trifle sunken; suture well-impressed. All of the whorls are convex, even the first one; the last descends somewhat in front.

Aperture oblique, lunate-oval, livid-flesh tinted within; entire peristome expanded, white, the columellar margin very broadly expanding, curving around and overhanging half of the umbilicus.

Alt. 21, greater diam. 26, lesser 21 mill.

Northwestern Australia.

This is the *H. prunum* of Reeve, Conch. Icon., pl. 68, fig. 353, and of Australian authors, Cox, (Austr. L. Sh., pl. 4, f. 6), of Brazier and Tate, but it does not agree with the original *H. prunum* of Ferussac in several respects. Of the latter Deshayes says: sa spire, très courte, se compose de six tours dont *les premiers sont aplatis et conjoints;* les suivants sont médiocrement convexes. And again: Toute cette coquille est d'un brun marron uniforme.

Férussac's variety (Hist., pl. 26, f. 9) which is more elevated, and has an obscure subperipheral band, is certainly a *Badistes* near *H. dunkiensis*, etc., and not a variety of *prunum*.

The italics in the above quotation are my own. The flattened inner whorls and chestnut-brown color would indicate that *H. prunum* Fér. is a *Badistes* rather than identical with this *Chloritis*, which has convex inner whorls and a light brown color.

Fig. 14 represents a small portion of the last whorl, just below the

suture, magnified to the same extent as fig. 12 which represents the sculpture of *H. coxeni* Cox. It will readily be seen that the two are quite distinct.

This form might be referred to *H. pelodes* Pfr. were it not that the color and measurements given by Pfeiffer do not correspond with it, and Pfeiffer himself considered *pelodes* a synonym of *prunum* Fér.

The synonymy of the true *H. prunum* Fér. is correctly given in Manual vol. VI, p. 135. Pfeiffer's figures of *prunum* (Conchyl. Cab.), are copied from Férussac, as are also Tryon's (Manual vol. III, pl. 50, figs. 25, 26). Fig. 26 represents the "variety" with a peripheral dark band.

C. COXENI Cox. Pl. 55, figs. 10, 11, 12.

This species is readily distinguished from the *H. prunum* of Australian authors, by the much more separated granules or hair-points, which are, moreover, obviously arranged in oblique lines, a disposition not found in *H. prunum*. The umbilicus is larger and more expanded in *coxeni* than in *prunum*, although the shell is smaller.

A more minute granulation becomes visible under a strong lens, covering the surface between the hairs or hair-scars. The figure represents a small portion of the surface of the last whorl, just below the suture. I am indebted to Dr. Cox for specimens of this and the last species.

C. MICHOLITZI Möllendorff.

Shell half-covered umbilicate, depressed-globose, horny-buff colored; transversely striatulate, having short hairs standing in regular series, 24 in 1 square millim. Spire little elevated, above flattened, the apex immersed. Whorls 4, convex, separated by a rather deep suture, the last whorl inflated, suddenly and shortly deflexed in front, contracted behind the aperture, almost crested, the base rather swollen, obtusely angled around the umbilicus. Aperture oblique, broad truncate-oval; peristome broadly expanded, slightly reflexed, sublabiate, buff, the columellar margin very broad, white-calloused, forming an indistinct angle with the basal lip.

Alt. 11·5, diam. 18 mill.; aperture, width 12·5, length 10, alt. 6·5 mill. (*Mlldff.*)

Tenimber Is.

Chloritis micholitzi MLLDFF., N. D. M. Ges. 1892, p. 95, t. 1, f. 5.

No species closely allied to this remarkable form is known to me. (*Mlldff.*)

C. TENUITESTA Möllendorff. Pl. 50, figs. 16, 17.

Shell moderately, nearly covered umbilicate, subglobose, buff-horn colored; transversely lightly plicate-striatulate, having very short, crowded hairs standing in regular series, 12–15 in one square millim. Spire conoid, apex flat. Whorls 4½, convex, at the suture rather deeply flattened, the last whorl inflated, a little descending in front, obtusely angulated around the umbilicus. Aperture rather oblique, excised-subcircular; the peristome thin, little expanded, the upper margin subangular at the upper insertion, then somewhat straightened; lower margin well arched, the columella strongly dilated.

Alt. 10, diam. 15 mill.; aperture breadth 9, length 8, alt. 7 mill. (*Mlldff.*)

Tenimber Is.

Chloritis tenuitesta MLLDFF., N. D. M. G. 1892, p. 96, t. 1, f. 8.

Has much the aspect of an *Eulota*, but the regularly arranged hairs show it to be a *Chloritis*, not far removed from the preceding species. It differs from that in having a half whorl more, in being thinner, the hairs stand less closely and are much shorter; the peristome is thin, hardly expanded, and near the upper insertion the lip is visibly angled.

C. rhodochila MLLDFF., Nach.-Bl. D. M. Ges. 1892, p. 95. Unfigured.

Tenimber Is.

Allied to *Chloritis mendax* Mts., and *C. brevipila* Pfr.

Helix inquieta DOHRN, Nachr.-Bl. 1889, p. 60.

Puerto Princesa, Palawan, Philippines.

Near *tomentosa, everettii* and *quieta.*

Section *Sulcobasis* Canefri.

Helix (*Sphærospira*) *rohdei* DOHRN, *MSS.*, Kobelt, Nachr.-Bl. 1891, p. 203.

Astrolabe Bay, New Guinea.

Helix (*Sphærospira*) *lepidophora* DOHRN, *MSS.*, Kobelt, *l. c.*, p. 204.

Astrolabe Bay, New Guinea.

Section *Trichochloritis* Pils.

C. MALAYANA v. Moellendorff. Pl. 51, figs. 34, 35.

Shell rather widely umbilicated, depressed, thin, having very short hairs arranged in regular, close lines; rufous-brown. Whorls 5½, very convex, separated by deeply impressed sutures; spire nearly flat, apex but slightly projecting; last whorl large, much inflated, shortly descending in front, subacutely angular around the umbilicus. Aperture not very oblique, rounded-lunar; the peristome thin, narrowly expanded, a trifle reflexed, sinuous, roseate.

Alt. 14, greater diam. 23, lesser 18 mill. (*Moll.*)

Perak.

Helix (*Trachia*) *malayana* v. MOLLDFF., Journ. Asiat. Soc. Beng. lv, p. 303; P. Z. S. 1891, p. 335, t. 30, f. 6, 6a.—*Planispira breviseta* CROSSE, Journ. de Conch. 1876, p. 336, not of Pfr.

Evidently closely allied to *H. breviseta* Pfr.

C. REMORATRIX Morlet. Pl. 52, figs. 47, 48, 49.

Shell broadly and profoundly umbilicated, subdepressed above, very convex below, rather thin, whitish, covered with a thin and minutely punctate (hairy?) epidermis; ornamented with very delicate growth-striæ and several narrow brown spiral lines at irregular intervals. Spire short; whorls 5½, nearly flat, separated by a channelled suture; the last whorl carinated at the periphery, a little depressed above, begirt by unequal concentric lines beneath. Aperture ovate-subrhomboidal, the margins joined by a thin callus; columellar margin short, dilated, the lip white, reflexed. (*Morl.*)

Alt. 13, greater diam. 24, lesser 20 mill.

Road from Bassac to Siempang, on the left bank of the Mekong, Laos. (L. Dugast.)

Helix (*Chloritis*) *remoratrix* MORL., in Crosse and Fischer's Journ. de Conch. 1892, p. 317, t. 6, f. 3, 3*a-b*. (Issued in April, 1893.)

Resembles in form and coloration the *H. molliseta* Pfr., a species belonging to the Papuan fauna.

H. COLLETTI Beddome. Pl. 51, figs. 36, 37, 38.

Shell openly umbilicate, orbiculate-depressed, rather thin; spire nearly flat; whorls 5, the last obsoletely angulate at the periphery, not descending, very prominently and coarsely striated obliquely; color light fawn, with a dark band at the periphery; aperture

somewhat oblique, lunately suborbicular; peristome simple, very slightly reflexed, margins not joined.

Diameter [illegible] inch, height [illegible] inch, width of umbilicus 5 mill. (*Bedd*).

The Shan States, Upper Burma.

Helix colletti Bedd., P. Z. S. 1891, p. 314, t. 29, f. 7–9.

Examples of these species were collected for Dr. Hungerford by Mr. Boxall, who accompanied Col. Collett's expedition. It belongs to the section *Planispira* Beck, being allied to *H. fallaciosa*, the sculpture is very similar to that of *H. gobanzi*. Type in the Natural History Museum.

H. shanica Beddome. Pl. 51, figs. 39, 40, 41.

Shell narrowly umbilicate, depressedly turbinate, rather solid; whorls 5, gradually increasing, rather convex, the last subangulate at the periphery, slightly descending toward the mouth, all furnished with a fine oblique striation, more prominent on the last whorl; color a light fawn, darker at the apex of the shell and near the mouth, a narrow dark band just above the periphery; aperture oblique, rotundately lunar; peristome slightly reflexed, dark fawn colored, the margins distinct.

Diameter $\frac{9}{16}$ inch, height $\frac{3}{8}$ inch. (*Bedd.*)

The Shan States, Upper Burma.

H. shanica Bedd., P. Z. S. 1891, p. 314, t. 29, f. 10–12.

Also collected for Dr. Hungerford by Mr. Boxall. Referable to the section *Planispira*. Type in the Natural History Museum. (*Bedd.*)

C. meander Godwin–Austen. Pl. 56, figs. 7–8.

Shell dextral, discoid, inflated, deeply and openly umbilicated, side of umbilication subangular; sculpture of a rough papery texture; color dull umber-brown, with a broad white band following the suture, peristome pinkish; spire low; apex flat, slightly ascending above the body-whorl; suture rather shallow; whorls 4, rounded on the periphery; aperture widely ovate, perpendicular; peristome reflected, slightly sinuate below; columellar margin subvertical.

Maj. diam. 16·2, min. 13·0; alt. axis 6·0 mill. (*G. A.*)

Mulu Mountains, Borneo, (Boxall, in coll. Dr. Hungerford.)

Helix (Chloritis) meander G.-A., P. Z. S. 1891, p. 43, t. 2, f. 2, 2*a*.

This is allied to *H. quadrivolvis*, v. Martens, which has a narrow colored band and differs in form. I have named it after H. M. frigate "Meander" which did much good service in Bornean waters in the early days of Rajah Brookes occupation.

C. PLENA Godwin–Austen. Pl. 56, fig. 16.

Shell depressedly globose, openly umbilicated; umbilical margin hollow, subangular; sculpture finely granulate, covered with a strong epidermis; color pale umber-brown, with a faint indication of a peripheral band; spire low; apex flat, slightly raised above the body-whorl; suture shallow; whorls nearly 5, gradually increasing; aperture oval, nearly vertical; peristome milky white, reflected; columellar margin suboblique. Size of specimen drawn, maj. diam. 18·8, min. 15·5, alt. axis 8·5 mill. Largest specimen, maj. diam. 19·0, min. 16·0; alt. axis 8·9 mill. (*G.-A.*)

Labuan (Sir H. Low, in coll. Dr. Hungerford).

Helix (*Chloritis*) *plena* G.–A., P. Z. S. 1891, p. 44, t. 2, f. 8.

There were five examples of this shell in the collection.

Subgenus HADRA Alb. (Vol. VI, p. 125)

The main feature distinguishing *Hadra* from *Chloritis* is that the apex in the former is neither concave, notably flattened nor sculptured by regularly arranged hair-points.

This group seems to be more justly regarded as a subgenus of *Chloritis* than as a separate genus. Hedley suggests to me that the microscopic sculpturing of *Hadra* is a reminiscence of the hair-granules of *Chloritis*.

Section *Hadra s. str.*

H. BIPARTITA Fer.

Dr. Cox proposes to call the unicolored yellow form of this species var. *unicolor*.

Section *Badistes* Gould.

(*Group of H. bitæniata, Vol. VI, p.* 144.)

H. BITÆNIATA Cox. For figs. see Vol. IX.

A much more globose form of this species than that already described is here figured. It has quite the contour of a *Xanthomelon*.

H. FODINALIS Tate. Pl. 58, figs. 2, 3, 4.

Shell moderately umbilicated, globosely conic, rather thin and somewhat glossy; surface coarsely and closely wrinkled transversely, somewhat closely and finely incised-striate in a spiral direction.

Whorls four and a half, regularly convex, separated by a linear suture: first two and a half whorls almost smooth, but minutely granulated and obsoletely wrinkled: the granulations disappear, and the wrinkles increase in strength and closeness with the revolutions of the spire.

Last whorl somewhat inflated, slightly descending in front, base convex to the umbilical margin. Umbilicus moderately wide with precipitous sides, and toward the inner lip subangulated.

Aperture oblique, subcircular; peristome subacute, slightly reflected, margins not joined by a callus. Columella margin dilated above and slightly extending over the umbilicus.

Color, a pale-brown above, paler beneath, sometimes with a narrow reddish-brown infuscation in front of the suture.

Animal:—Foot of a chestnut color with gray rugosities, broad and short behind: eye-pedicels of a blackish and tentacles of a chestnut color; collar milk-white.

Major and minor diameters, 18 and 15 mill.; altitude, 14·25 mill.; height of aperture, 10, length of aperture 9 mill.; diameters of umbilicus 3 and 3·5 (vix) mill. (*Bednall.*)

Affinities and differences:—The nearest ally of this species is *H. nullarborica* Tate, from which it differs in the absence of an impressed suture, finer and closer spiral striæ, larger umbilicus, as well as by coloration and thinness of test; it is related to *H. angasiana*, Pfeiffer, but has more regularly convex whorls, coarser growth-lines, less rotund and not so descending aperture, less thickened and reflected peristome. *H. bitæniata* Cox, is a more distant alliance, from which it differs mainly by its less elevated spire and large umbilicus. (*Bednall.*)

Waukaringa, S. Australia, beneath blocks of stone; betw. Victoria Spring and Fraser Range.

Helix (*Hadra*) *fodinalis* TATE, Trans. Roy. Soc. S. Austr., xvi, p. 63, t. 1, f. 1*a-c*. (Dec. 1892).

H. EVERARDENSIS Bednall. Pl. 58, figs. 22, 23, 24.

Shell umbilicated, globosely conical, somewhat thin, translucent,

lower whorls closely ribbed by stout irregular and oblique flat-topped costæ, which are coarsest behind the aperture, and gradually fade away on the upper whorls into fine striæ; under the lens irregularly pitted throughout; epidermis pale yellow, much abraded, exposing in places the chalky-white of the shell substance; encircled immediately above the periphery by a chocolate zone about a millimeter broad, and beneath the suture, which is impressed, a slightly narrower band of the same hue, the intervening space being wider than either band, the spire is so coiled that the suture throughout its extent divides the lower band of the upper whorl from the upper band of the succeeding one, lip of aperture white; whorls four and a half, gradually increasing, evenly rounded from the suture to the base, last descending in an alignment with the peripheral band; aperture very oblique, oval-lunate, slightly expanded and reflected above, and much so beneath; columella remarkable for its wide and straight expansion callus, thin, transparent; umbilicus narrow, deep, and spiral, abrupt at the margin and steep within, partially overhung by the columella, and slightly choked by an internal swelling of the termination of the last whorl. (*Bednall.*)

Major diameter 13, minor 11·5, alt. 9·25 mill., height and length of aperture 6·75 mm.; diam. of umbilicus 2·5 mm.

Near Illbillee Soakage, Everard Range, at an elevation of 2000 feet. (*Bednall.*)

Helix (*Hadra*) *everardensis* Bednall, Trans. Roy. Soc. S. Austr. xvi, p. 64, t. 1, f. 3*a-c* (Dec. 1892.)

This species, of which only a single specimen was obtained, is the smallest member of the subgenus *Hadra* yet known, and comes very close to one taken during expedition to Lake Eyre in the years 1874–5, of which there are two examples in the South Australian Museum Collection.

Mr. Brazier on seeing the shell noted its very close resemblance to *H. australis* Menke, but the figure of that species as reproduced in Dr. Cox's monograph could not be taken as a guide to its identification.

H. elderi Bednall. Pl. 58, figs. 5, 6, 7.

Shell umbilicated, depressedly globose, thin, translucent, coarsely obliquely striated, more so at the suture; yellowish-white, and having two rufous bands, one, the broader, just above the periphery,

and the other at the suture, the suture being wound around the center of the lower band of the preceding whorl, and the right margin of the peristome inserted at the lower edge of this band; spire elevated, obtuse at the apex. Whorls five, convex, regularly increasing, the last rounded and inflated at the base in the region of the lip, descending slightly in front; aperture oblique, roundly lunate, margins approximating, peristome thin, broadly reflected, and very effusely dilated; columellar margin narrowly expanded above, and reflected over and partially concealing the umbilicus. (*Bednall.*)

Measurements.—Major diam. 17, minor 14, alt. 12 mill.; height and length of aperture 10 mill.; diameter of umbilicus 2 mill.

Birksgate Range.

Helix (*Hadra*) *elderi* BEDNALL, Trans. Roy. Soc. S. Austr. xvi, p. 66, t. 1, f. 2*a-c* (shell); 4, 5 (jaw and teeth.)

This species is allied in its general characters to many South Australian congeners, and is also ornamented with the rufous bands so peculiar to the most of them, but is specially remarkable for the very effuse dilatation of the outer lip, more particularly so where it reaches the base of the shell. (*Bednall.*)

H. OSCARENSIS Cox. Pl. 58, figs. 25, 26, (x 2).

Shell lenticular; of a dull lustrous opaque cretaceous pale cream color, except the three apical whorls, which are of a dark yellowish-brown hue, and this deepening of color in a less degree is manifested in a few irregular-sized spaces across the whorls (not sufficiently shown in fig. 25). Whorls six, very gradually increasing in size; irregularly, but closely, rather coarsely, transversely arcuately striate, with lines of growth becoming less distinct on the three apical whorls as they approach the apex; the whorls are flatly slanting, not so rounded as fig. 25 would lead to suppose, smoother below the periphery of the last whorl than above; last whorl sub-acutely keeled at the periphery, the keel is white and opaque, margining the periphery of the last whorl before reaching the peristome, causing it to be rather acutely angled; immediately below the peripheral carinal edge of the last whorl, the color of the shell is darker than the rest of the lower half of the whorl. With the mouth away from one, as shown in fig. 26, the shell is seen to have a deep open umbilicus, more so than is represented in fig. 26, about one-third of it being overlapped by an expanded columella; the peristome is

simple, everted and slightly expanded; aperture roundly lunate, darker within than at the internal edge; upper edge of the peristome inserted into the carinal margin of the periphery of the last whorl; columella triangularly expanded, white and smooth, no trace of a callous expansion between the ends of the peristome on the body whorl. The suture of the whorls is well impressed, margined above with a faint opaque white line, a continuation of the carinal margin of the periphery. The apex shows no signs of a granular sculpture.

Diam. maj. 20, min. 17, alt. 14 mill. (*Cox.*)

The Oscar Ranges, 20 miles from the Barrier Ranges, West Australia (*Froggatt*). Type in the Macleay Museum.

Helix (*Hadra*) *oscarensis* Cox, Proc. Linn. Soc. N. S. Wales, (2) vi. p. 565, t. 20, f. 6, 7.

H. DERBYI Cox. Pl. 58, figs. 20, 21.

Shell depressedly globose; whorls 5½ to 6, very gradually increasing, with a moderately large open deep umbilicus, more so than is represented in fig. 21; the periphery of the last whorl is smoothly rounded to the aperture; color light brown, marbled with lighter patches, but not regularly across the whorls; surface strongly but irregularly transversely striated with curved lines of growth, the convexity of the curves being upward. Apex very slightly raised; last whorl deflected at its termination; the periphery is margined by a narrow pale band, but in no way carinated; aperture elongately lunate, the right margin inserted below the center of the periphery of the preceding whorl, the columellar margin with a slight expansion at its insertion, the edge of the peristome very slightly everted and thickened. Apical whorl quite smooth. The base of the shell is convex, more faintly striated than the upper surface, of a lighter color and not marbled. Whorls rounded, suture deep and well defined, but not margined.

Diam. maj. 11, min. 9, alt. 6 mill. (*Cox.*)

The Derby District, Barrier Ranges, Western Australia (*Froggatt*). Type in Macleay Museum.

Helix (*Hadra*) *derbyi* Cox, *l. c.*, p. 566, t. 20, f. 4, 5.

(*Group of H. grayi Pfr.*)

H. GULOSA Gould. (Vol. VI, p. 131.)

Mr. John Brazier has given the synonymy of this species in full,

in the Proc. Linnean Soc. N. S. Wales, (2), vi, p. 321 (May 23, 1892). He includes as synonyms of GULOSA Gld. 1846, the following: *H. coriaria* Pfr. 1847, *H. morosa*, Morel. 1853, *H. monacha* Pfr. 1859, *H. mastersi* Cox 1864, *H. scotti* Cox 1864.

To this list I am disposed to add *H. lessoni* PFR., Symbolæ iii, p. 71 (1846); Conchyl. Cab. p. 363, pl. 138, f. 9. 10.—? REEVE, Conch. Icon. f. 754. Not *H. lessoni* of Cox (Mon. Austr. L. Sh.), of Pilsbry, (Manual vol. VI) or of authors generally.=*H. seminigra* Morelet. The *H. duralensis* Cox, is probably a stunted form of *gulosa*.

H. JERVISENSIS Q. & G.

H. gulosa intergrades by imperceptible degrees with *H. grayi* Pfr. (Manual vi, p. 130), as Dr. Cox has written me, and demonstrated by a set of shells showing the intermediate stages (no. 62,413 of the Academy collection.)

The synonymy of the *grayi* type of shells is believed by my friend Dr. Cox to be as follows; *H. jervisensis* Q. & G. 1832, *H. gilberti* Pfr. 1845, *H. grayi* Pfr. 1848, *H. exocarpi* Cox 1868, *H. bednalli* Braz. 1871. I am in full agreement with this synonymy. Dr. Cox also suggests that the lighter, thinner forms, *corneovirens* Pfr. 1851, and *mulgoæ* Cox 1868, may prove to fall into this series.

It may not be out of place to correct here the references given under *H. grayi* Pfr. in the text (p. 130). They should stand as follows: *Helix* (GRAY, New Zealand, t. 1, f. 8, 9.) PFEIFFER, Symbolæ ad Historiam Heliceorum, iii, p. 68, (1846).—*Helix grayi* PFR., Monogr. Hel. Viv. i, p. 134 (1848.)

The reference given by Pfeiffer to Gray relates to some unpublished plates sent to him by Gray. These plates have never, I believe, appeared in print. The name "grayi" dates from 1848.

Section *Sphærospira* Mörch.

H. BLOMFIELDI Cox. (Vol. VI, p. 154).

Var. *warroensis* Hedley & Mousson. This is the chestnut colored form, figured by Tapparone Canefri, Viag. Magenta, t. 2, f. 5.

Warro, Queensland.

H. ROCKHAMPTONENSIS Cox. (Vol. VI. p. 159).

Var. *pallida* Hedley & Mousson. Bandless, of a tawny-yellow color. (*H. & M.*, P. L. S. N. S. W. (2) vi, p. 556).

Rockhampton, Queensland.

H. INFORMIS Mousson. (Vol. VI, p. 160). Pl. 51, figs. 27, 28.

Two figures are here given, drawn from specimens received from Dr. J. C. Cox. It is the largest species of *Sphærospira*. The surface shows, under a strong lens, a beautiful sculpture of close, fine wavy wrinkles, having a general direction parallel to the shell's axis.

One of the specimens figured is from *Port Mackay*, the other from *Mt. Dryander, Queensland.*

H. RAWNESLEYI Cox. (Vol. VI, p. 165.)

The figures given in Vol. IX are drawn from a specimen received from Dr. Cox. It is a notably solid shell, with numerous whorls, somewhat flattened base, dark-edged lip and nearly covered umbilicus. Under a strong lens the upper surface shows a sculpture of most minute, close wrinkles, generally parallel to the axis, but criss-cross in places. The specimen is from Mt. Dryander, Queensland.

H. INCEI Pfr. (p. 167).

As varieties Hedley includes *bayensis* Braz., *lessoni* Auct. *aureedensis*, Brazier. (See P. L. S. N. S. W. (2), vi, p. 556). The latter was collected by Mr. Mousson at Rockhampton.

H. AUREEDENSIS Brazier (p. 169). Pl. 54, figs. 7, 8, 9.

This hitherto unfigured species is depressed, solid, dark colored with a few darker bands, a white sutural line and a light yellow, ill-defined umbilical patch. Aperture livid inside; the slightly expanded, thin lip is white on both face and reverse. Under a lens the surface shows fine spiral striæ.

Section *Xanthomelon* Mts.

H. PERINFLATA Pfr. (Vol. VI, p. 183). Pl. 58, fig. 1.

This shell was first obtained by Mr. F. G. Waterhouse in the MacDonnell Ranges, Central Australia, when accompanying John Macdougall Stuart in his exploration across the continent, and was described by Pfeiffer in 1863 from the specimens there procured. It was the prevailing species collected by Mr. Helms, and specimens were taken from Mount Illbillee on the Everard Range, westward to the Victoria Desert.

Those taken at the commencement of the journey answer most closely to the description transferred by Dr. Cox to his Monograph

of the Land Shells of Australia. A feature of these particular specimens is that some of them are encircled with a somewhat broad rufous band just above the periphery, which in very many of the examples has a tendency to spread toward the suture. In others again, there is not the slightest semblance of the band of color, and it is evidently specimens of this type that were submitted to Dr. Pfeiffer, as he makes no mention of this character. Of a number of living and mature shells received by me some two years since, some do and some do not exhibit the band. This species varies a great deal, not so much in shape as in thickness, and again in coloration. The typical form is solid, but by far the greater number of the shells obtained during the expedition are comparatively thin, and appear to be identical with a race of this species which has extended southward from the MacDonnell Ranges, and of which we have examples collected at Wilson and Carrieton. At one locality a dwarf form was taken very much in size and shape like *Helix flindersi* Adams and Angas, but without the color-bands of that species. In coloration the shell varies considerably; some are a creamy-white, others have a faint interrupted cloudy-reddish band just above the periphery; in others this band becomes a most distinctive marking, while in very many the band extends from the periphery to the suture, being darkest in the center. In the dwarf examples the shells are of a uniform greenish hue, with a shining vitreous appearance. (*Bednall*).

Helix (*Galaxias*) *perinflata* Pfr. BEDNALL, Trans. Roy. Soc. S. Australia, xvi, pt. 1, p. 63, t. 1, f. 6 (Dec. 1892).

Subgenus RHAGADA Alb.

H. SUPRACOSTULATA Schepman. For figs. see Vol. IX.

Shell globosely depressed, with a covered umbilicus, only perceptible as a narrow slit; solid, upper part distinctly plicately ribbed, base rather smooth; whitish with a rather broad dark brown band at the periphery and a narrow one near the sutures, besides a number of paler bands above and below varying much in the individual; apex obtusely convex; whorls 4½, slightly convex, last whorl descending abruptly in front. Aperture oblique, rounded; lip slightly expanded, thickened, white; columellar margin covering nearly completely the umbilicus, with a tooth-like projection, outer margin near the peripheral band with a second very faint tooth, margins approximating, united by a thin callosity. (*Schepm.*)

Diam maj. 14½, min. 12½, alt. 11 mill.
Diam. maj. 14, min. 12, alt. 10 mill.
Diam. maj. 13, min. 10½, alt. 9 mill.
Diam. maj. 12, min. 11, alt. 9½ mill.

Ka-Tokawai, East Soemba, and Soemba, without more definite locality.

Helix supracostulata SCHEPM., Notes from the Leyden Museum, xiv, p. 150, t. 6, f. 1 (July, 1892).

This species approaches *Helix solorensis*, but the latter is larger, more umbilicated, nearly smooth and without teeth in the aperture: it resembles very much *H. reinga* Gray (Reeve, Conch. Icon. fig. 772), but the aperture is rounded and not triangularly lunar. The sculpture in *H. reinga* is called obliquely striated, and no mention is made of a second tooth on the outer lip.

The specimens vary in shape and size and in the number of the bands, which in some specimens are nearly limited to the sutural and peripheral ones; in other specimens the whole shell is banded. (*Schepm.*)

Genus PLANISPIRA Beck. (Vol. VI, p. 274.)

It is doubtful whether this group should be separated generically from *Chloritis*.

Three sections are distinctly differentiated within the group: *Planispira s. str.*, and *Cristigibba*, defined and limited in the Manual VI, and *Trachiopsis* (n. sect.), proposed to include the Australasian species hitherto grouped under *Trachia*.

Trachiopsis is anatomically unknown. The shell is small and shaped like Planispira, but has more cylidrineal whorls, covered with a brownish cuticle, and constricted behind the lip. The aperture is round or angular, oblique, and the lip is well expanded and reflexed. As in the typical *Planispira*, the basal lip has a tendency to become toothed. Type *H. tuckeri* Pfr.

Section *Planispira* s. str.

P. ZONARIA Linn. (Vol. VI, p. 277.)

Boettger recognizes var. *lineolata* Mts., *nitidiuscula* Bttg., subvar. *albina* Mts., var. *fasciolata* Less. (+ *collis* Mouss.). See Ber. Senck. Ges. 1891, p. 265, 266.

P. HALMAHERICA Strubell, Nachr.-Bl. D. M. Ges. 1892, p. 44.

Halmahera. Unfigured. Near *P. zonaria.*

P. THETIS Pfr. is reported from Halmahera by Strubell, who believes it a distinct species from *P. exceptiuncula.*

Section *Cristigibba* Canefri.

To this section belongs *H. purpurostoma* Le Guillou, described in the Manual Vol. VI, p. 177. It is evidently closely allied to *H. dominula, deaniana, corniculum* and the following.

P. MACGREGORI Hedley. Vol. IX, pl. 12, figs. 13, 14, 15.

Shell umbilicated, discoidal, thin, translucent; color reddish-brown above, lighter beneath, peristome bright lilac, interior of shell subnacreous, iridescent, gleaming bluish-white; whorls 4½, rounded, the earlier gradually, the last rapidly increasing, last descending considerably and gradually at the aperture and furnished with the gibbosity characteristic of the genus; sculpture oblique, flat-topped, costæ whose shallow interstices contain two or three fine radiating striæ, both costæ and striæ are crossed by minute spiral grooves; apical whorl sunken, smooth; suture deeply impressed; aperture diagonal, lunate, peristome widely expanded above, reflected below, margins approaching, connected by a thin, transparent callus, columellar margin expanded over a quarter of the umbilicus; the latter narrow, deep, showing every revolution of the spire, margins abruptly rounded.

Diam. maj. 28, min. 21, alt. 12 mill. (*Hedley.*)

Village of Arpiana, St. Joseph River, New Guinea (Hedley.)

Cristigibba macgregori HEDLEY, P. L. S. N. S. W. (2), vi, p. 82, t. 10, f. 17–19 (shell); ibid. p. 687, t. 38, f. 6 (jaw) and t. 39, f. 12 (dentition).

Dead shells were seen in abundance, animals were purchased from the natives. Dedicated to Sir William Macgregor, M. D., K. C. M. G., whose zeal for science has greatly increased the world's knowledge of the Papuan fauna and flora. Type in Queensland Museum. (*Hedley.*)

Section *Trachiopsis* Pilsbry.

P. DENTONI Ford. Pl. 51, figs. 44, 45, 46.

Shell small, depressed, umbilicate, rather thin, shining; color corneous-brown, encircled above the periphery by a faint brown zone. Surface under a lens presenting a roughish appearance, caused by

granules elongated in the direction of lines of growth. Spire depressed, slightly convex; apex obtuse. Whorls 4, gradually widening, the last depressed; deeply and abruptly descending to the aperture, rounded at the periphery, very strongly constricted behind the peristome. Aperture very oblique, nearly circular; lip narrowly expanded, flattened, white, upper and lower margins continuous across the parietal wall, the basal margin slightly thickened within. Umbilicus deep, rather narrow.

Alt. 3, diam. 7 mill.

New Guinea.

This species is allied to *H. tuckeri* Pfr. but may readily be distinguished from that species by the continuous peristome, more oblique aperture and deeper constriction of the whorl behind the lip.

Helix (*Trachia*) *dentoni* Ford, The Nautilus iii, p. 17. Ancey, The Conchologist, 1891, p. 31.—*Cf.* Brazier in Hedley, P. L. S. N. S. W. (2) vi, p. 82.

Ancey has declared this species to be a synonym of *H. cyclostomata*, but of course this is a blunder. It is much more likely that Brazier is correct in saying that the range of variation in *H. tuckeri* will include the *dentoni*; but the considerable number of specimens of *tuckeri* examined by Mr. Ford and myself show no transition forms. Brazier and Hedley believe that the specimen is from Queensland, and got in among Denton's New Guinea shells accidentally. It was washed out of a large New Guinea Helix by a son of the lamented Wm. Denton.

P. baudinensis Smith. Pl. 58, figs. 8, 9.

Shell discoidal, broadly, perspectively umbilicated, pale brownish. Whorls 4, slightly convex, separated by a deep suture, sculptured with numerous rather thick, oblique, slightly undulating ribs; the first two whorls smooth; the last whorl having a long, rather shallow depression toward the aperture, above, constricted behind the lip, and deeply descending. Aperture contracted, auriform; peristome whitish, slightly expanded and reflexed, having a conspicuous tubercle inside and a smaller basal one.

Greater diam. 6, lesser 5 mill. (*Sm.*)

Baudin Island, N. W. Australia (J. J. Walker.)

Helix (*Conostoma*) *baudinensis* Sm., The Conchologist, ii, p. 97, figs.

The principal features of this little species are its depressed and openly umbilicated form, the strong costulations, and the contracted dentate aperture. The shallow depression upon the upper surface of the last whorl commences behind the peristome, and running parallel to but a little distance from the suture, extends about half way round. The upper margin of the peristome is indented above the conspicuous tubercle, and, between it and the suture is arched, but very little expanded. On the contrary, both in front and at the base, it is more dilated and reflexed. (*Sm.*)

P. COLLINGII Smith. Pl. 58, figs. 10, 11.

Shell orbicular, depressed, broadly umbilicated, brown above, pallid below, covered with a short-haired epidermis. Whorls 4–5, rather slowly increasing, slightly convex, separated by a profound suture, minutely sculptured throughout with delicate and punctate growth-lines; the last whorl rounded at the periphery, slightly descending in front, lightly impressed above behind the lip. Aperture nearly horizontal, rounded-triangular; peristome narrowly expanded above, the columellar margin broadly reflexed, basal lip subdentate within.

Alt. 4, greater diam. 10, lesser 8½ mill. (*Sm.*)

Baudin Island, N. W. Australia (J. J. Walker.)

Helix (*Gonostoma*) *collingii* E. A. SMITH, The Conchologist, ii, p. 98, figs.

Shell flatly discoidal, with the spire only very little raised above the body-whorl, rather openly umbilicated, light brown above and pale beneath. When in fresh condition the surface is covered with a thin, shortly pilose epidermis. Worn shells exhibit innumerable minute punctures showing where the short delicate setæ have been. Whorls 4½, regularly and rather slowly increasing, moderately convex, and separated by a deep sutural line; besides the punctures, exhibiting fine lines of growth; last whorl rounded at the periphery, only very feebly deflexed close to the aperture, and exhibiting a slight depression above, about the middle of the upper margin of the peristome. Aperture somewhat triangular in outline but with rounded angles, almost horizontal in position; peristome narrowly reflected above, more broadly expanded along the basal margin, especially over the umbilicus. A conspicuous tubercle or prominence occurs on the inner edge of the basal margin and a less pronounced one within the upper margin corresponding to the

slight depression upon the outer surface of the whorl.

I have much pleasure in naming this very interesting species after Mr. W. E. Collinge, the energetic editor of this journal. (*Sm.*)

Genus PAPUINA Martens (Vol. VII, p. 3).

For many of the following notes and corrections the writer is indebted to Mr. Chas. Hedley of the Australian Museum, Sydney, N. S. Wales, who, both in letters and in his excellent paper on the "Land Molluscan fauna of British New Guinea" has made most valuable additions to our knowledge of this group.

Page 5. P. CHANCEI Cox. The locality given is incorrect. It has been collected by Rev. G. Brown at *Lauru Village, New Ireland*, and *Biara, New Britain*. The original description and figure were from a deformed specimen. The normal shell is *H. amphizona* Pils., which now becomes a synonym.

Page 11. P. DAMPIERI Ang., is not from the Louisiade Archipelago.

Page 15. H. BEATRIX Ang., is a synonym of *P. miser* Cox, p. 20.

Page 16. According to Dr. Cox (in litt.), *H. splendescens* Cox, *brenchleyi* Braz., and *mendana* Ang. are synonymous. This seems to me to be the case, specimens of the former having been sent me by Cox. The first name, P. SPLENDESCENS Cox, has priority.

Page 25. *H. lacteolata* (not "laeteolata") is in all probability a variety of P. BRAZIERÆ.

Page 29. *H. horderi* Sowb. is a synonym of P. LEONARDI T. C., p. 32.

Page 40. P. TAUMANTIAS Tap. Can. var. *cingulatus* Hedley. Yellowish-white, encircled by a single brown peripheral band, margined beneath by an opaque white line. Village of Aipiana, St. Joseph River, British New Guinea. (Hedley!) Type in Queensland Museum.

Page 45. P. SICULA Brazier. According to Hedley, *H. meditata* Tap. Can. (p. 40) is a synonym.

Page 44. P. TOMASINELLIANA Tap. Can.

Var. *anozonata* Hedley, 1891. Bandless, entirely yellow. Douglas

River, British New Guinea (Bevan!) Type in Queensland Museum.

Var. *agnocheilus* Smith.

This form is from the same locality as the last, being in fact, merely a color variety. Smith writes :

This species is remarkable for the broad snow-white lip, the truncate columella, and the very strong thread-like lines of growth. It is variable in color, sometimes being conspicuously banded or entirely without bands excepting that at the suture. The bands do not extend quite to the outer lip, but stop short about 4 mill. from the margin. Three of the four specimens examined have a shallow concentric depression or furrow around the middle of the base of the body-whorl ; but this not an essential characteristic, as there is not the slightest trace of it in the fourth shell.

H. tomasinelliana of Tapparone Canefri is very like this species in many respects, but is different in form, being higher in proportion to the width and with a flatter base.

Alt. 34, greater diam. 42, lesser 33 mill.

Douglas River, British New Guinea.

Helix (Papuina) agnocheilus E. A. Smith, P. Z. S. 1891, p. 488, t. 40, f. 5.

Page 47. P. BOYERI F. & B. is from *Woodlark I., teste* Hedley, P. L. S. N. S. W. 1891, p. 95.

Page 52. P. BRUMERIENSIS Forbes.

Var. *albolabris* Hedley. Lip entirely white.

Page 53. P. RANGII Lesson. The diameter should read 36 mill., and *Guinea* should be substituted for *Zealand* in the locality.

Page 54. H. DIOMEDES Brazier. In place of "*Constance Island*" read *Coutances I.*, 148° 10′ *E. long.*, 10° 15′ *S. lat.*

Page 55. P. MACGILLIVRAYI Forbes.

To the localities given, add *Bloomfield River* (Hedley) ; *Bellenden Ker Mountain* (Broadbent). In the reference to Hedley read *Queensl.* in place of *N. S. Wales.*

Page 59. P. ALBOCARINATA Sm., belongs according to Hedley to the group of *P. louisiadensis.* It is from *Woodlark I.*, not from South Cape, N. Guinea.

Page 63. P. ROLLSIANA Smith, is not from South Cape, New

Guinea, but from *Seymour Bay, Ferguson Island.* (See Hedley, P. L. Soc., N. S. Wales 1891, p. 90).

Page 78. The habitat of *H. cyrene* Crosse, is Ugi, Solomon Is. Hedley believes it to be merely a form or var. of *H. helicinoides*, together with *zelina*, *cineracea*, and *quirosi*.

P. TROBRIANDENSIS Hedley. For figs. see Vol. IX. Pl 37

Shell imperforate, trochiform, thin, translucent, keeled at the periphery, keel becoming obsolete latterly; color white, encircled by seven chestnut bands, four above and three below the periphery, these bands are very variable, each or all may disappear or coalesce; when absent a translucent band marks the site; the bands fade away on the penultimate whorl; occasionally as in allied species opaque alternate with translucent dashes radiating from the suture, peristome from the insertion of the right margin to the center of the base an intense black; whorls 4½, convex, last contracted; sculpture obliquely finely striated and finely granulated, apex obtuse, embryonic whorls distinct, 1½; suture impressed; base slightly convex; aperture oblique, scarcely descending, peristome expanded and reflected, right margin sinuate, columellar margin straight, bearing above a small tubercle, margins connected by a thin, transparent, microscopically granulated callus.

Diam. maj. 24, min. 18, alt. 16 mill. (*Hedley.*)

Trobriand Islands (Kowald and Belford); on trees; abundant.

Geotrochus trobriandensis HEDLEY, Proc. Linn. Soc., N. S. Wales (2) vi, p. 92, t. 11, f. 28 (shell); ibid. p. 690, t. 38, f. 5 (jaw), 39, f. 14 (radula) 42, f. 33 (genitalia).

P. HEDLEYI Smith. *Unfigured.*

"This handsome species is imperforate, elevately conical, the almost straight outlines forming at the apex an angle of about 60 degrees. It is sharply keeled at the periphery and almost quite flat beneath. The upper and lower surfaces present a strong contrast of color. The base is uniformly dark chestnut brown, whereas the rest of the shell is of a yellowish buff tint, excepting a fine opaque luteous line upon the keel, which revolves up the spire forming a distinct margination above the suture, and a narrow dark brown zone beneath the suture. The first four whorls are rather convex, the next two are almost flat, and the last or body-whorl is distinctly concave above the carina. The surface is glossy, and exhibits dis-

tinct, very fine, oblique and flexuous lines of growth, in addition to which, under a powerful lens, minute but feeble spiral striæ are observable. The base is similarly sculptured, but the radiating lines of growth have a rather coarser appearance. A few indented irregular concentric lines upon the base, and a few short oblique ones upon the body-whorl above the keel and behind the lip, may be individual rather than specific characters. The aperture is oblique, whitish within, and much pointed and channelled in front at the termination of the keel. The upper lip is thin, expanded, and tinted with dark brown at the edge; the lower is also similarly colored, is strongly reflexed, and in the umbilical region somewhat expanded. The terminations of the peristome are remote, but connected by a thin layer of callus upon the flat surface between.

"The single specimen, all that is known of this species, has recently been purchased by the British Museum. Until lately it formed part of a collection which was got together many years ago, and which remained packed up for fifty or sixty years. Although no locality accompanied the shell, we can safely assume, from its resemblance to allied forms, that it was an inhabitant of New Guinea or some adjacent island. *H. ferussaci* of Lesson, and *H. exsultans* of Canefri, are the nearest allies. Neither of these species is nearly so large as that now described. The former is higher in proportion to the width, and is described and figured as being of an uniform rich chestnut color, excepting the golden yellow carina and edging to the suture. On the contrary *H. hedleyi* is much wider in proportion to the height, and the difference of colour between the upper and lower surfaces is most marked. Besides this the aperture in Lesson's shell appears to be dark brown, whereas in this it is white. From *H. exsultans* the present species is distinguished, not only by its considerably larger size, but also by a difference of coloring and the greater flatness of the whorls and the base.

"I have named this interesting form after Mr. C. Hedley, author of several valuable papers on terrestrial mollusca of Australia, New Guinea, etc." (*Smith.*)

Alt. 30, greater diam. 36, lesser 30 mill.

Probably *New Guinea.*

Helix (*Geotrochus*) *hedleyi* E. A. Smith, Journ. of Conch. vii, p. 72, (Oct. 4, 1892).

P. CHONDRODES Strubel. *Unfigured.*

Allied to *P. albula*. Halmahera. Nachr.-Bl. D. M. Ges. 1892, p. 45.

P. BEVANI Brazier. Pl. 57, figs. 18, 19.

Shell umbilicate, depressed, sharply carinated at the periphery, thin, obliquely striated, reddish-brown with a dark nearly black narrow line at the center, epidermis yellowish-brown; spire slightly elevated; apex dark pink; suture moderately impressed; whorls 4½, very slightly convex, last largest in front; umbilicus narrow, shallow; base flattened, striæ finer than on upper surface; aperture hatchet-shaped; peristome black, slightly expanded and reflected, right margin at the upper part thin; columellar margin broadly expanded and reflected over the umbilicus.

Diam. maj. 45, min. 35, alt. 18 mill.; height of aperture 12, breadth 21 mill. (*Brazier.*)

Douglas River, British New Guinea (Bevan).

Helix bevani BRAZIER in HEDLEY, Proc. Linn. Soc. N. S. Wales (2) vi, p. 85, t. 11, f. 22, 23.

This fine species is allied to *Helix goldei* Braz. A single dead specimen in a good state of preservation was found by Mr. Theodore F. Bevan, F. R. G. S., during his exploration of British New Guinea in 1887. Type in Australian Museum. (*Brazier.*)

P. ELISUS Hedley. Pl. 57, figs. 23, 24.

Shell umbilicate, thin, discoidal, carinate; color pale straw, with two narrow reddish spiral bands, the superior midway between the suture and the periphery, the inferior encircling the base at a third of the distance from the keel to the umbilicus, the carina is sometimes edged above and below by similar bands, peristome white; whorls 4½, increasing regularly until the final whorl, which in its latter half contracts a little, the earlier whorls slightly convex, the latter flat; sculpture close, irregular oblique striation above and below crossed by a few faint impressed lines in the neighborhood of the keel; apex obtuse, the embryonic shell apparently constituting the first revolution; suture impressed above becoming linear as it proceeds, margined above by the keel of the preceding whorl; base flattened at the periphery, slightly swollen within; umbilicus narrow, deep, exhibiting the volutions; aperture almost horizontal, abruptly and deeply descending, peristome thin, widely reflected throughout its circumference, pinched at the junction of the carina, margins closely approaching, connected by a transparent callus.

Diam. maj. 29, min. 24, alt. 10 mill. (*Hedley.*)

Geotrochus elisus HEDLEY, Proc. Linn. Soc. N. S. Wales, (2), p. 86, t. 11, f. 24, 25.

The Macleay Museum contains four dead shells of this species, which appear to resemble *G. pelechystoma* Tapp. Can., purchased from Mr. Goldie, who collected them in British New Guinea.

Genus? ALBERSIA Mts.

A. PSEUDOCORASIA Strubell, Nachr.-Bl. D. M. Ges. 1892, p. 47. Unfigured. Halmahera.

Genus PANDA Albers. (Vol. VI, p. 74).

Mr. Hedley adopts the following arrangement of species and varieties:

P. FALCONERI Reeve.

Var. *maconelli* Reeve. (See Manual VI, p. 76).

Var. *azonata* Hedley.

Bandless, entire shell straw-yellow colored.

Var. *tigris* Hedley.

The original dark spiral bands have here become disintegrated into separate blotches, and these latter have further become confluent with those above and beneath, so that the band pattern is changed from regularly spiral to irregularly longitudinal and zig-zag, in which state it approaches the pattern of *atomata* and *larreyi*.

P. ATOMATA Gray. (See Nautilus VI, p. 9, May, 1892.)

Var. *kershawi* Brazier.

In this genus, neither contour nor coloration can be relied upon to furnish specific characters, and I cannot admit *kershawi* Brazier (P. Z. S., 1871, p. 641) as a valid species. No habitat has been recorded for this form between the valleys of the Hunter and of the Snowy River. Yet, despite their geographical isolation, southern specimens can be precisely matched, as Dr. Cox has kindly demonstrated to me, by northern shells. Fossil specimens of this species have been identified by Dr. Cox, from Victoria, but none have come under the writer's observation, nor is he aware of any mention of the fact, in the literature of the subject. (*Hedley.*)

Var. *elongata* Hedley.

More elevated than the type, and represented by Mon. Austr. L. Shells, Pl. xviii, fig. 15.

Var. *azonata* Hedley.

Bandless, entire shell straw-yellow colored.

P. LARRYI Brazier.

Genus ACAVUS Montf.

Subgenus PYROCHILUS Pils.

A. LAMPAS Müller.

The locality of this magnificent species has been found to be Halmahera. Vide Strubell, Nachr.-Bl. D. M. Ges. 1882, p. 46.

APPENDIX.

The following species were omitted in the text of this volume.

Genus ENDODONTA Alb.

E. (CHAROPA) TEXTA Hedley. Pl. 45, fig. 8.

Shell depressed, turbinate, thin, perforate, glistening; color reddish-corneous; whorls 4½, rounded, flattened beneath the suture; sculpture strong, sinuate, oblique radiating ribs, of which the last whorl possesses about 60, in each interstice and parallel to the ribs are 4 or 5 fine raised hair lines; decussating these secondary costæ and of the same calibre are raised spiral lines, which are most prominent on the spire and base; epidermis possessing a silky sheen; suture deeply impressed; apex not prominent, embryonic whorls 1½, shining, nearly smooth, but faintly repeating the adult sculpture; umbilicus narrow, deep, spiral; base rounded; aperture oblique, roundly lunate, peristome straight, sharp, columellar margin reflected.

Diam. maj. 6, min. 5, alt. 4 mill. (*Hedley.*)

Mission Hill, upper St. Joseph River, Brit. New Guinea (2 living specimens in jungle under logs).

Charopa texta HEDLEY, Proc. Linn. Soc. N. S. Wales, vi, p. 79, t. 10, f. 12 (Sept. 9, 1891).

The type is in the Queensland Museum.

FLAMMULINA MASTERSI Brazier. Pl. 44, fig. 95.

Shell somewhat globose, thin, very faintly and irregularly trans-

versely striated, marked with irregular reddish and yellowish-brown flames running rather obliquely; spire very small, conical; suture impressed; whorls 3½, convex, the last very largely and openly dilated; aperture rather large, wide, ovately lunate; columella arched, and not thickened; peristome simple, acute.

Length 3¼, breadth 2¼; length of aperture 2¼ lines, breadth 1¾ lines. (*Brazier*).

Lord Howe Island, in a gully on the North Ridge, among dead leaves; one specimen.

Simpulopsis (?) *mastersi* Braz., P. Z. S. 1872, p. 619; Austr. Mus. Mem. 2, p. 27.—Pfr. Monogr. vii, p. 29.—Hedley, Rec. Austr. Mus. i, p. 141, t. 21, f. 9.—*Flammulina mastersi* Hedley, *in litt.* Dec. 17, 1892.

Type is in the collection of the Australian Museum.

Section *Paratrochus* Pilsbry (n. sect.)

Shell high, conic, having numerous whorls, narrowly umbilicated and well sculptured. Aperture nearly round, the peristome continued in a thin callus across the parietal wall.

E. dalbertisi Brazier. Vol. IX, pl. 3, ~~figs. 20, 21.~~

Shell umbilicated, pyramidally conical, thin, light reddish-brown, hyaline, spire raised, apex white, acute, whorls 8½, slightly convex, the upper half closely, obliquely, rugosely lined, the lower spirally granulated, suture channelled, crenulated, below small minute holes, having raised like callus at their edge, periphery with small keel, divided and crenulated, base convex, more rugose than upper surface, umbilicus rounded, small and deep, minute holes round the edge, aperture oblique, nearly circular, peristome thin, margins continuous, with thin deposit of callus on the body whorl; columellar margin slightly reflected over the umbilicus. (*Braz.*)

Alt. 8, greater diam. 7½, lesser 7 mill.

Yule Island, New Guinea.

Helix (*Ochthephila*) *d'albertisi* Brazier, Proc. Linn. Soc. N. S. Wales, i, p. 104.—Hedley, P. L. S. N. S. W. (2), vi.

Genus PATULA Held.

P. somersetensis Melvill & Ponsonby. Pl. 43, fig. 63.

Shell openly umbilicated, subconically depressed, smooth, white-

ashy. Whorls 4 (the last rapidly increasing), impressed at the sutures, gradatulate. Aperture oval; peristome thin, simple.

Alt. 2, diam. 1½ mill. (*M. &. P.*)

Somerset East, South Africa.

Helix (*Patula*) *somersetensis* M. & P., Ann. Mag., N. H. (6) xi, p. 19, t. 3, f. 2 (Jan., 1893).

A shell of simple character, with a superficial resemblance to *H.* (*Vallonia*) *pulchella* Müll. In the collection of E. L. Layard, Esq. Two specimens. (*M. & P.*)

Vol. III, p. 35, for *H. aulocospira*, read *H. aulacospira.*

Vol. III, p. 46, *H. arcuata* Pfr. is a *Vitrinoconus*, according to Milldff.

Vol. III, p. 52, *H. hypocrita* Dohrn. is said by Wollaston to be a synonym of *H.* (*Discus*) *pusilla* Lowe, p. 31.

Genus TROCHOMORPHA Alb.

TROCHOMORPHA NIGRANS *var.* CORNEA Hedley.

Smaller than the type, horn-colored.

Alt. 6, greater diam. 16, lesser 14 mill.

Sudest I., Louisiades. Type in Queensland Mus. (Hedley, P. L. S. N. S. W. (2) vi, p. 79).

Genus PLECTOPYLIS.

P. FULTONI Godwin-Austen. See Vol. IX for figures.

Shell sinistral, keeled, widely umbilicated, subglobosely discoidal; color pale ochraceous; sculpture a fine close flaxy epidermal striation, with four lines of long hairs arranged upon the periphery of the body whorl two closely adjacent and running with keel above, one around the umbilical depression, and one intermediate. Spire depressedly convex, suture well marked, apex rounded. Whorls seven, closely wound, side of the last very oblique below and flattened, becoming rounder near the aperture, where it descends very slightly. Aperture wide, semiovate, very oblique, and slightly reflected on the margin. Peristome not thickened, continuous over the parietal side. The internal barriers are not visible on looking into the aperture. The parietal vertical lamina is simple, with only a slight horizontal support above on the posterior side; a very short double knobbed horizontal parietal lamella is situated imme-

diately below it. Palatal plicæ double, in two rows, the two apical or highest in position being united together by a low ridge; the posterior row are somewhat obliquely arranged. (*G.–A.*)

Major diam. 20, minor diam. 17·3; alt. axis 8·5 mill.

Khasi Hills (?) *Assam*, exact locality unknown.

Helix (*Plectopylis*) *fultoni* Godwin-Austen, Ann. Mag. N. H. (6), x, p. 300, Oct., 1892. Figured in Hugh Fulton's advertisements in "Nature," "The Nautilus," etc., 1892, 1893.

This fine large species is quite distinct; the arrangement of the palatal plicæ is similar to that of *P. macromphalus* and *P. plectostoma*, while the junction of the two highest palatal plicæ being like that in *P. andersoni*, its position is intermediate between them (*vide* the characters of this genus given by me in the P. Z. S. 17th November, 1874, p. 612). *G.–A.*

Genus PHASIS (p. 135.)

Helix namaquana Martens. (*Unfigured*).

Sitz.-Ber. Ges. Naturf. Freunde, 1889, p. 161. Between Port Nolloth and Ananas, Little Namaland. The upper surface reminds one of *H.* (*Xerophila*) *instabilis*, the form of *H. proteus*.

Euhadra.

H. purpurascens Pfeiffer. Pl. 57, fig. 10.

Shell imperforate, subtrochiform, solid, minutely granulated all over, somewhat shining. Spire convex-conoid, tawny, the apex rather obtuse, Whorls 6, slowly increasing, a trifle convex, the last whorl more convex, subcarinated and begirt with white below the middle, becoming purple in front, swollen, shortly descending, the base rather flattened. Aperture very oblique, triangular-lunar, with a pearly luster inside; peristome brown, reflexed, the margins joined by a thick shining callus, columellar margin somewhat straightened.

Alt. 15½, greater diam. 29, lesser 25 mill. (*Pfr.*)

Corea (Cuming).

Helix purpurascens Pfr., P. Z. S. 1853, p. 126; Monogr. iv, p. 202.—Reeve, Conch. Icon. t. 185, f. 1281.

The systematic position of this species is quite unknown to me. It is probably an *Euhadra*.

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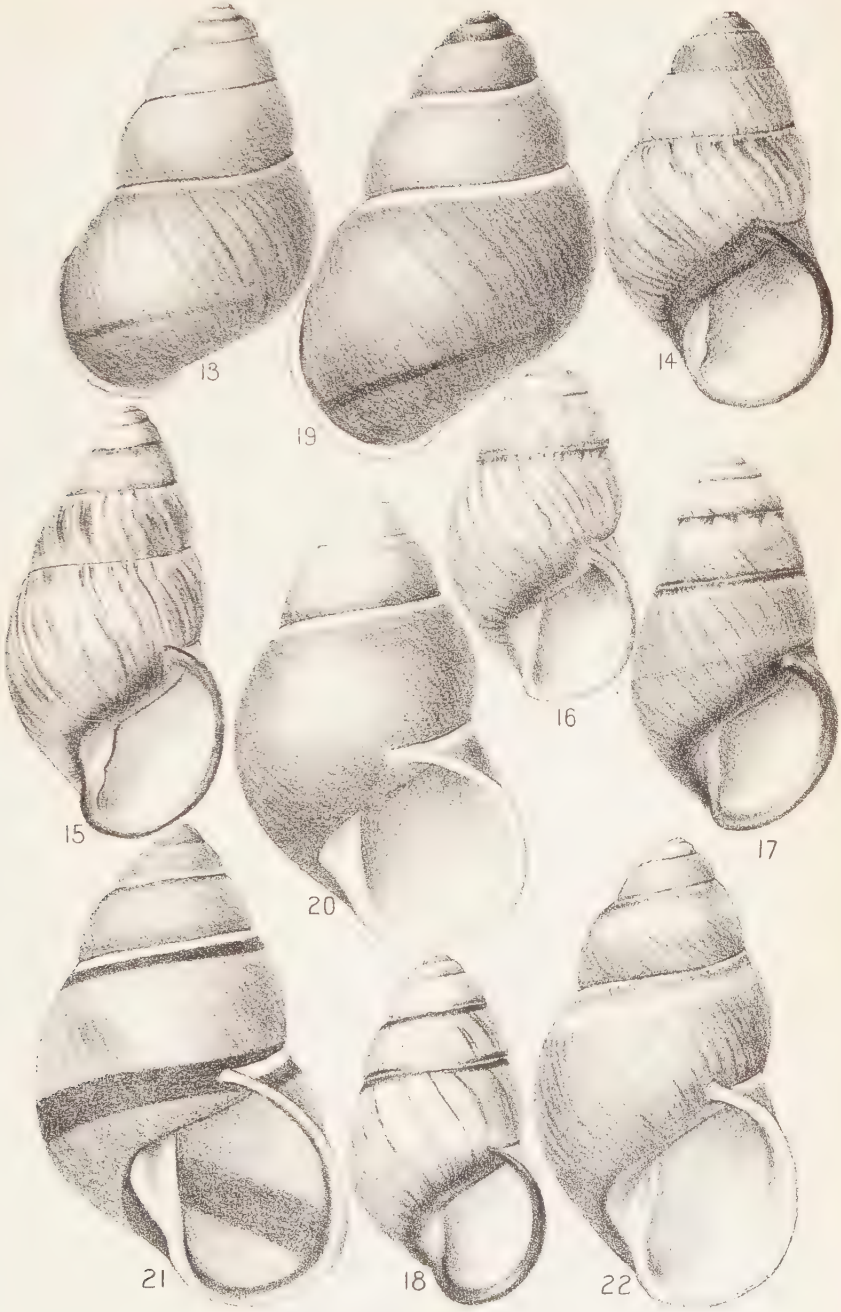
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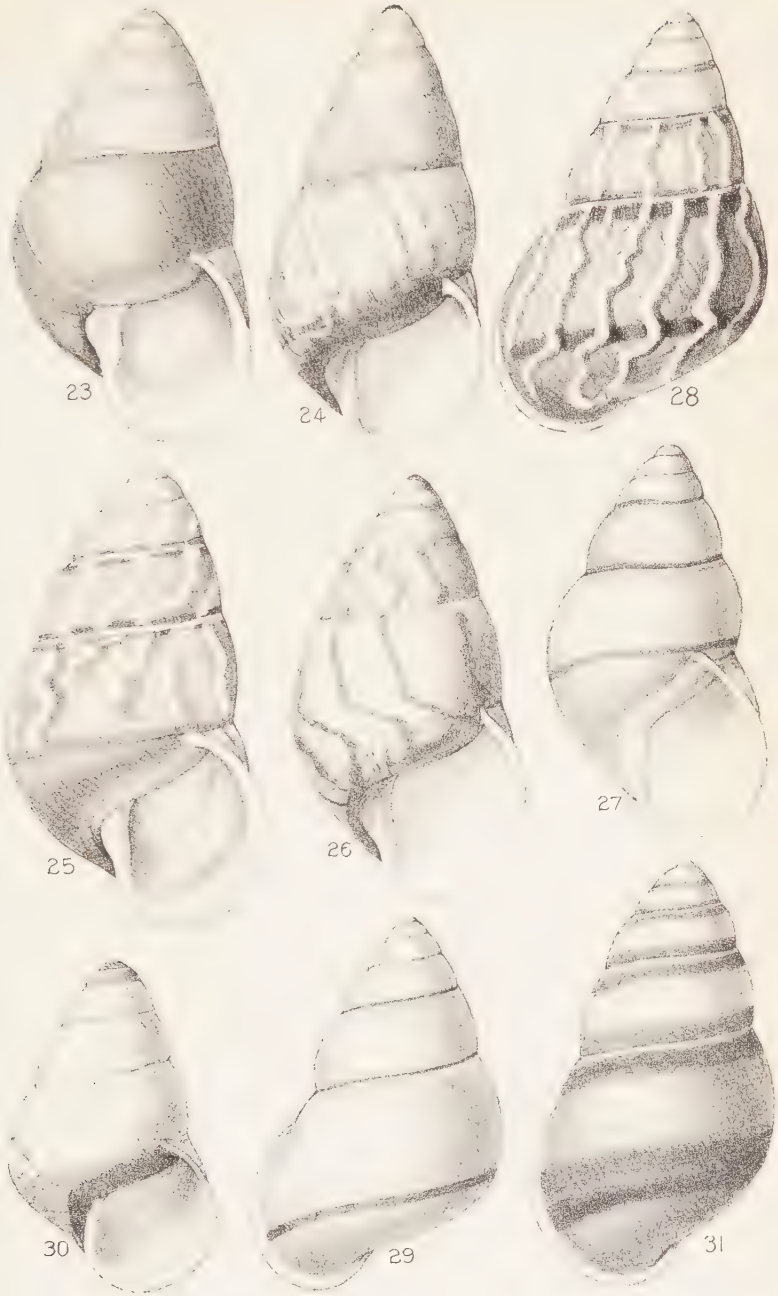
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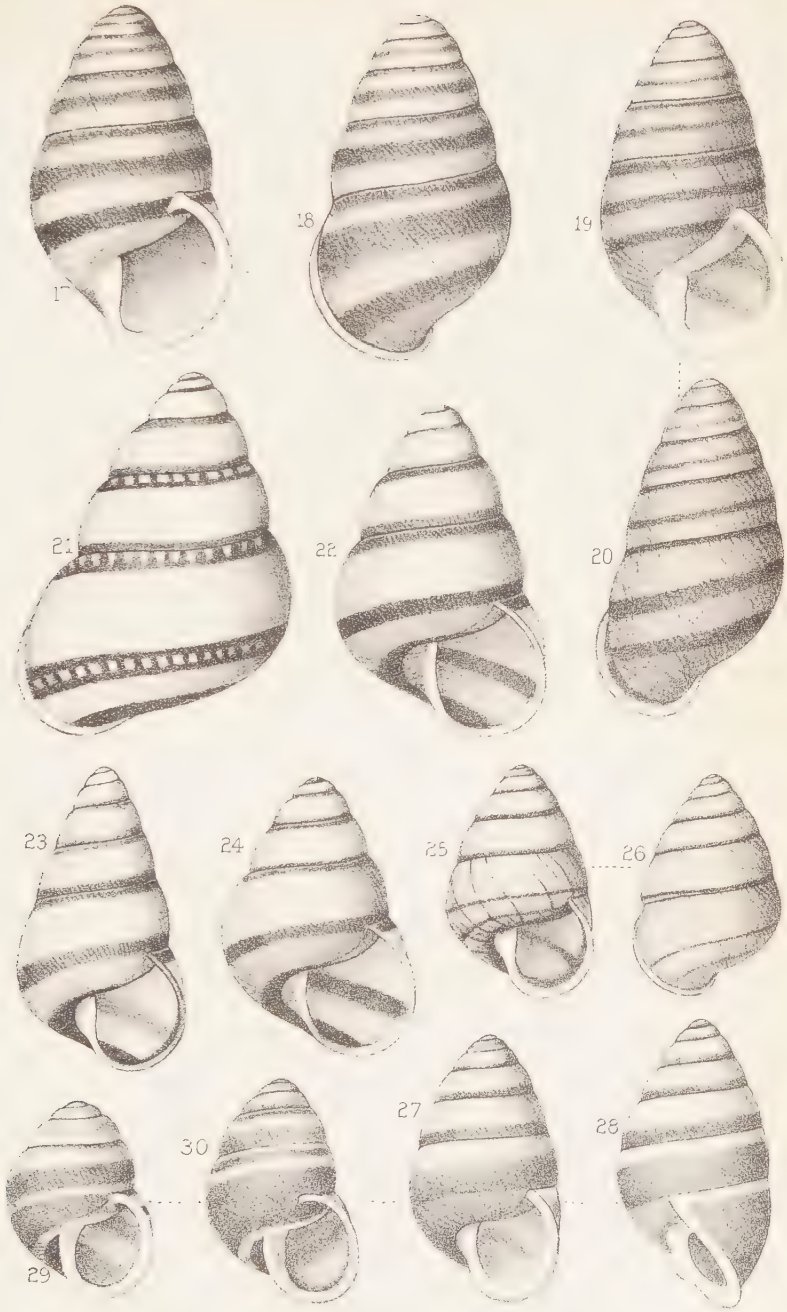
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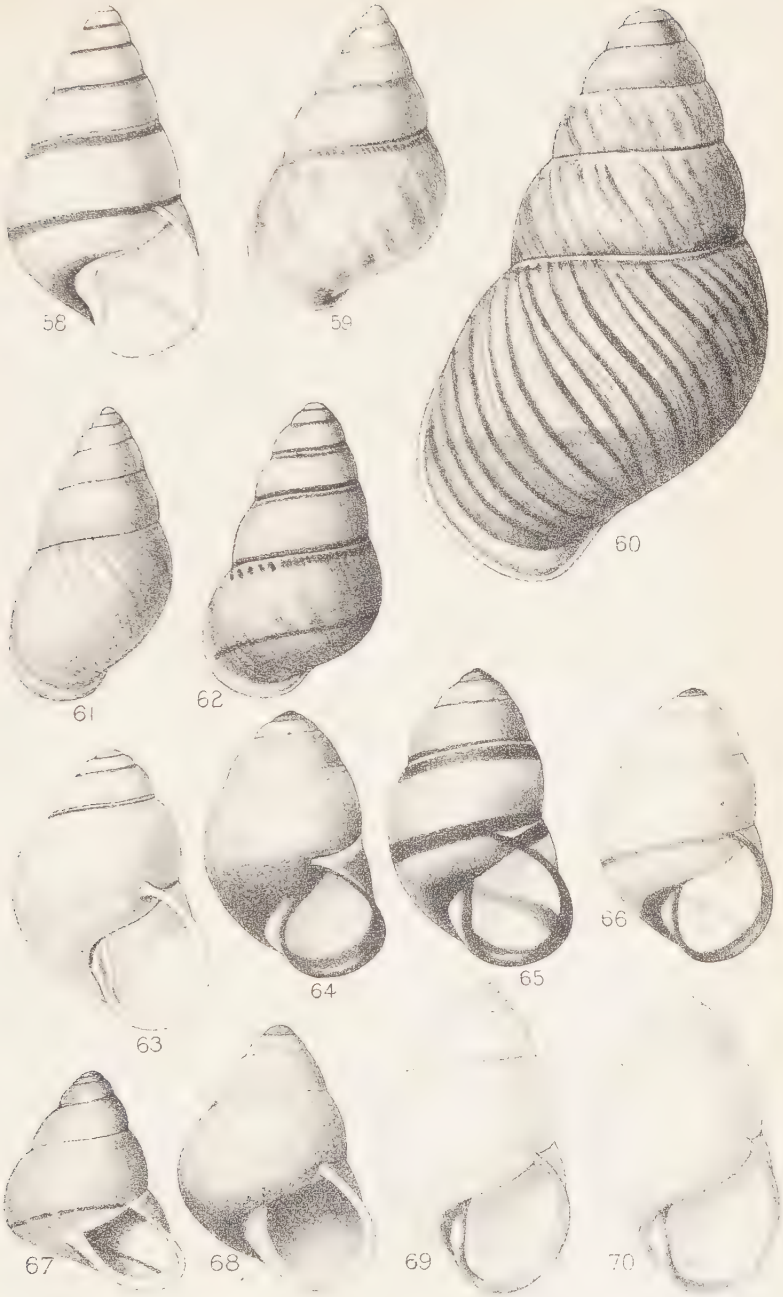
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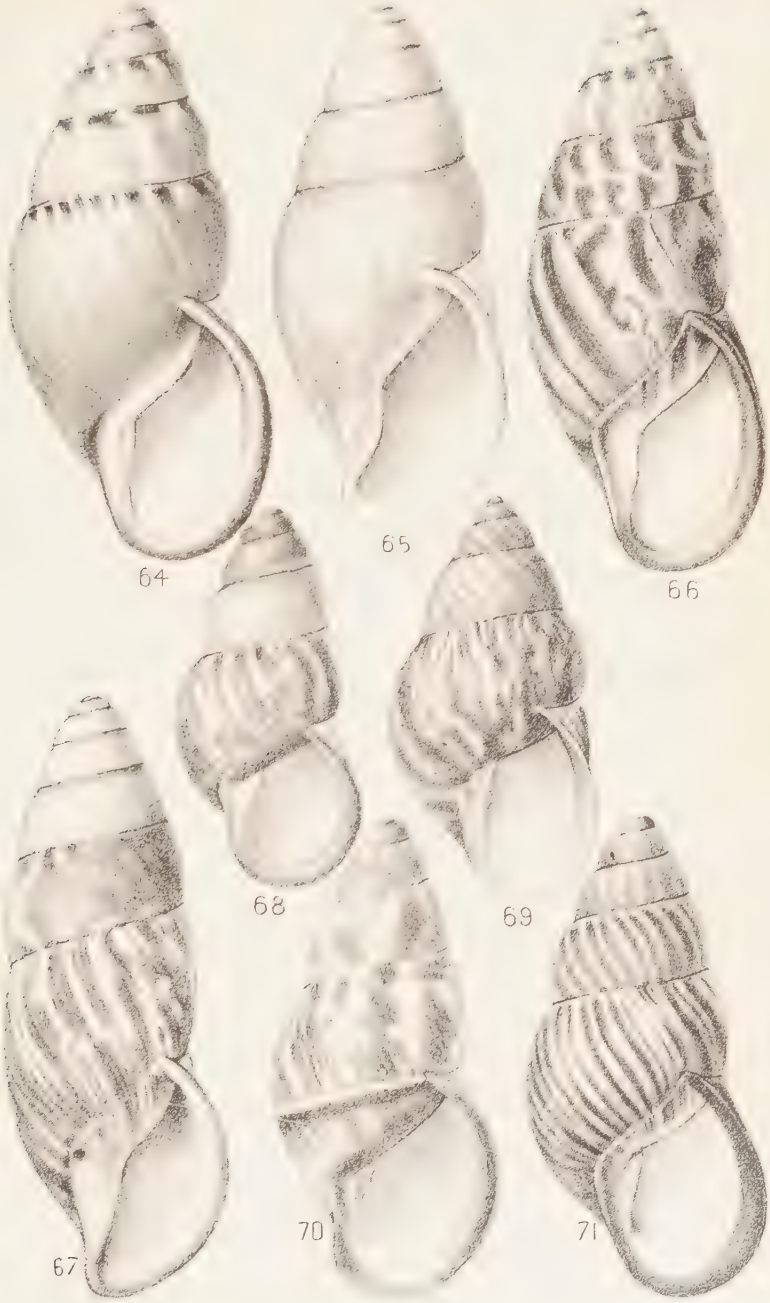
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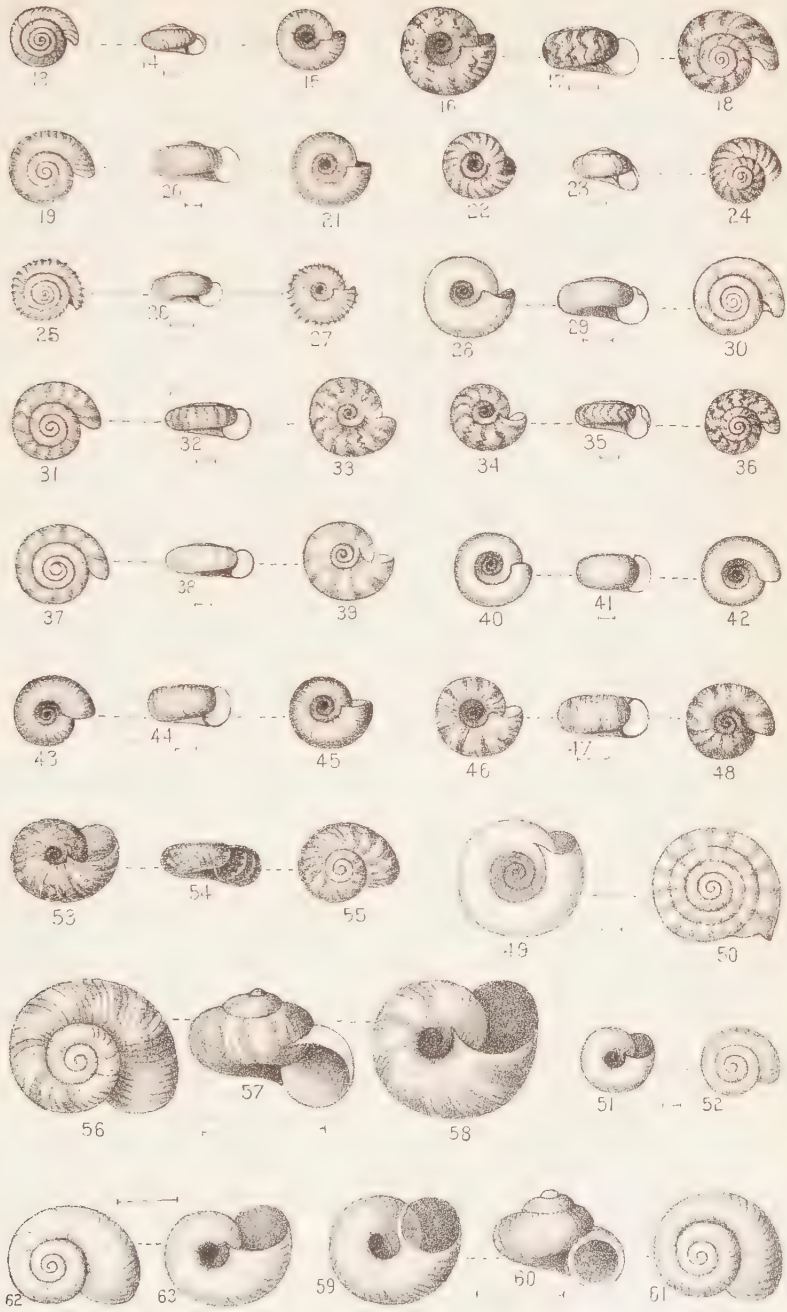
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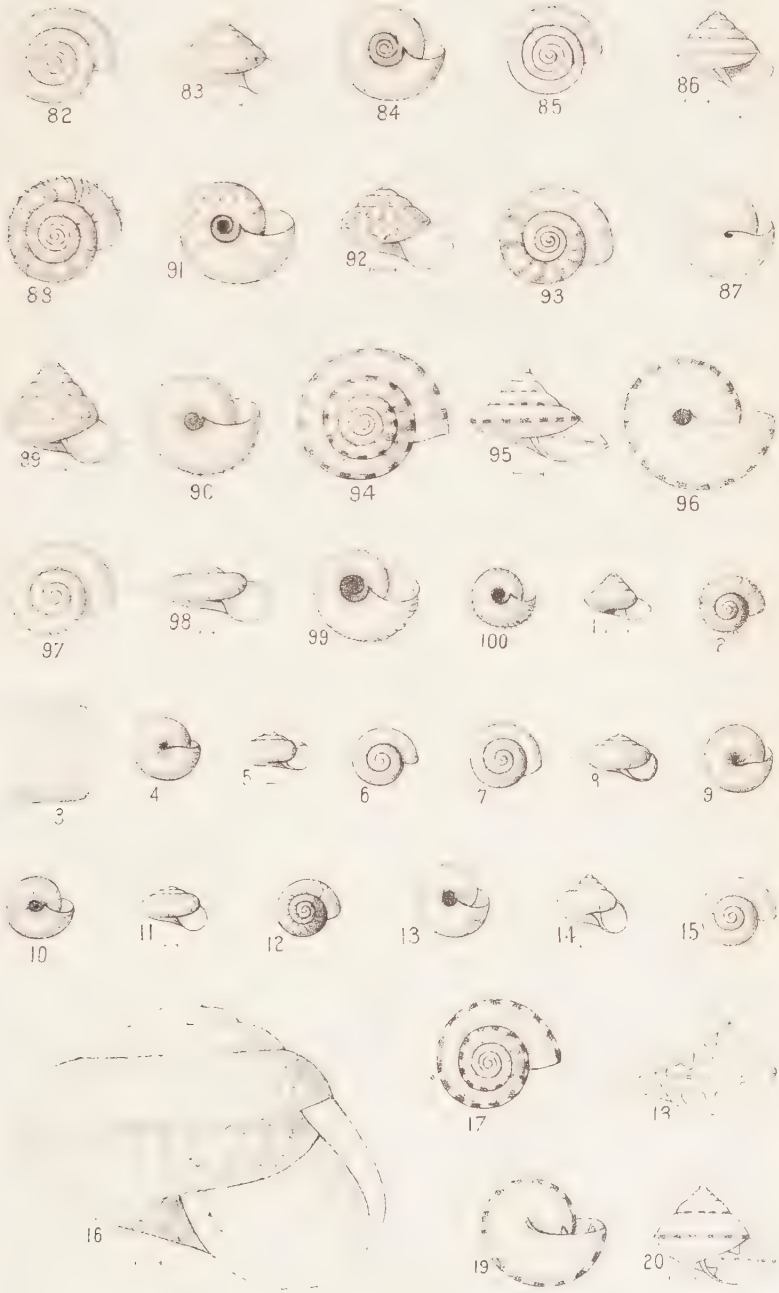
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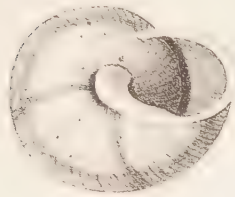
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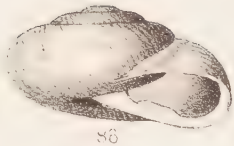
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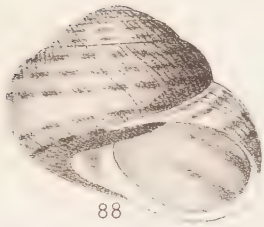
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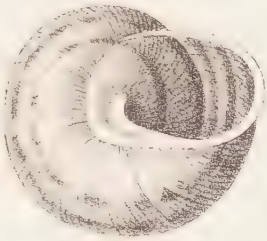
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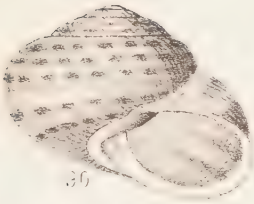
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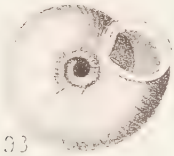
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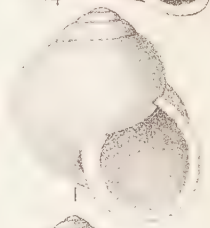
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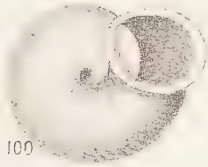
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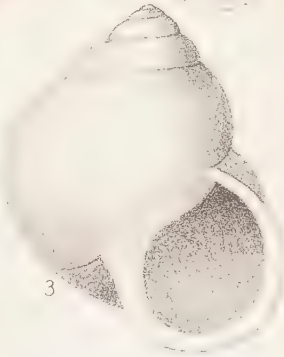
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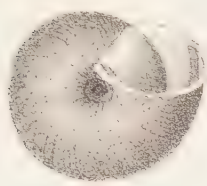
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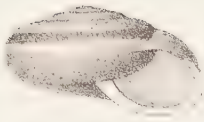
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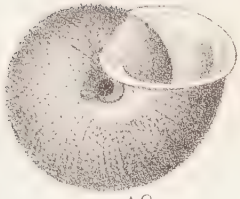
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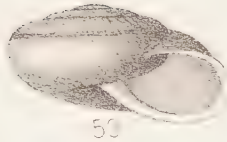
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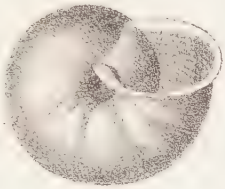
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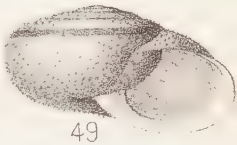
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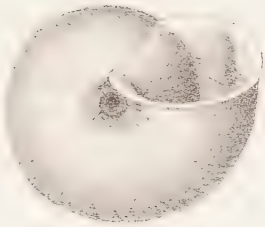
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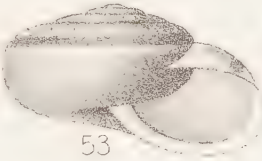
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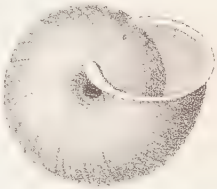
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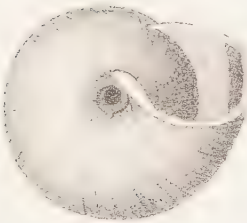
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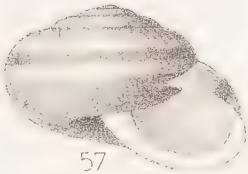
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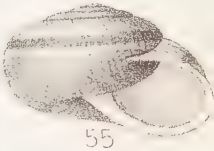
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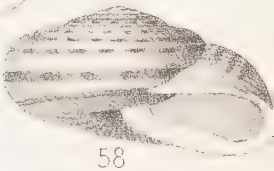
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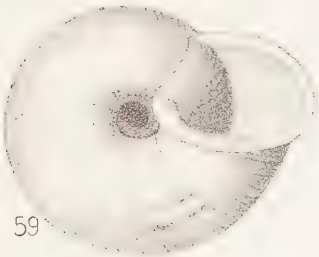
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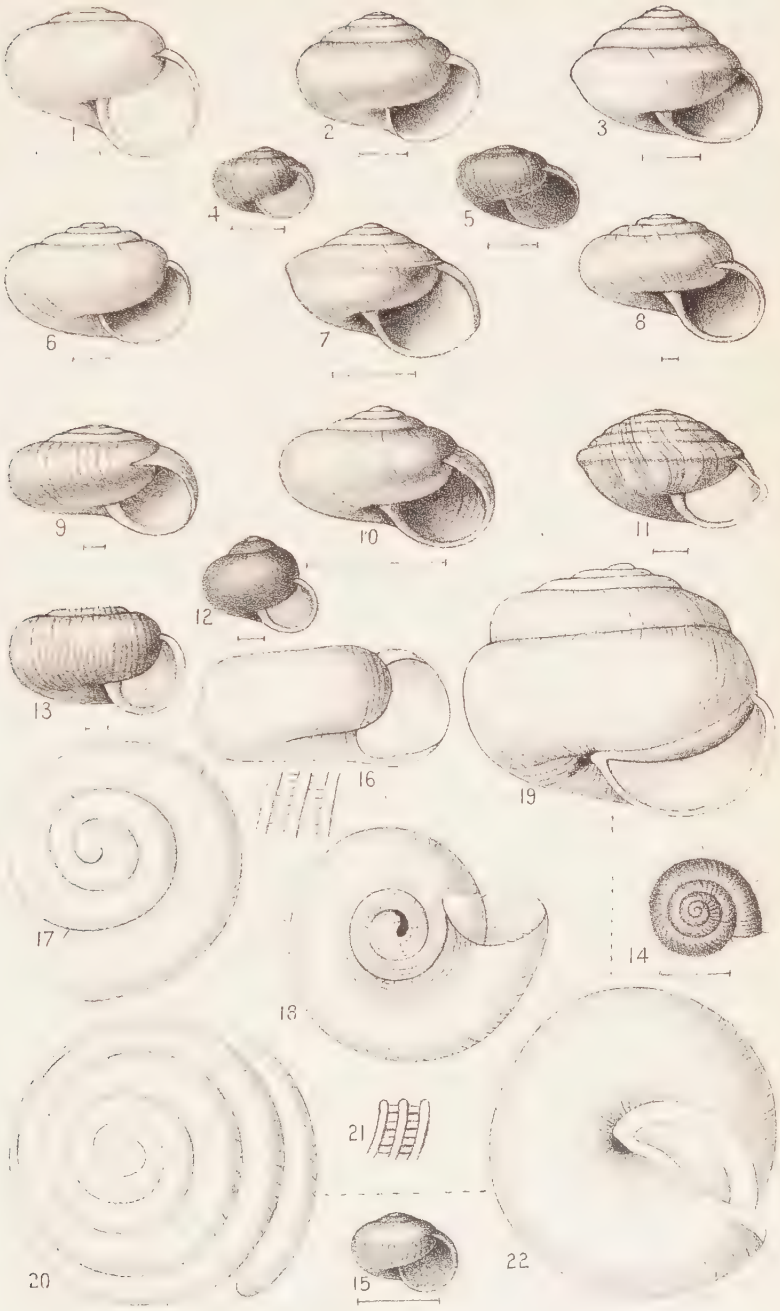
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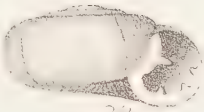
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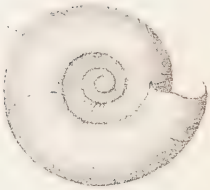
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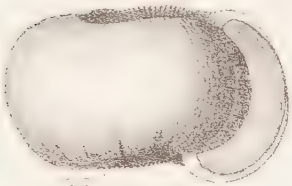
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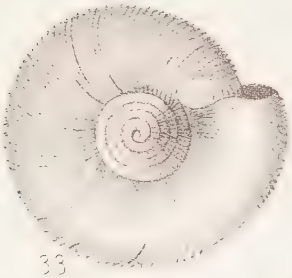
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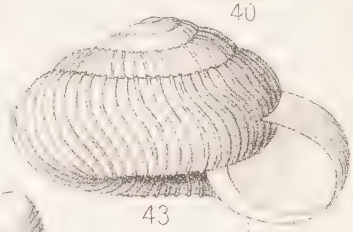
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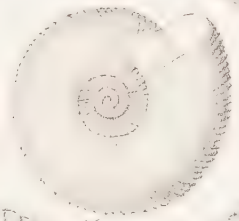
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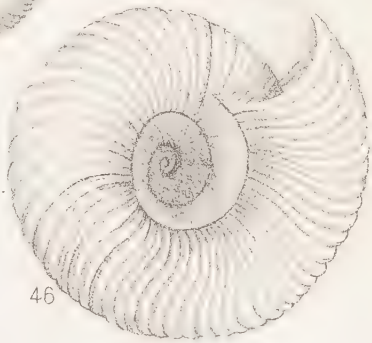
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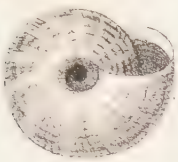
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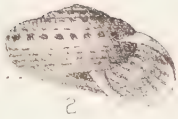
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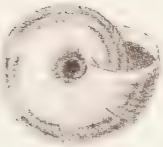
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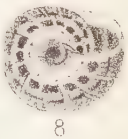
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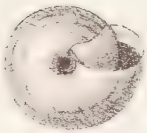
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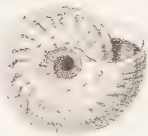
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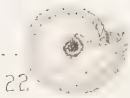
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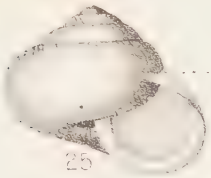
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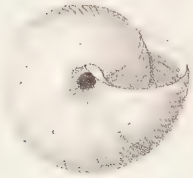
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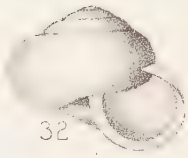
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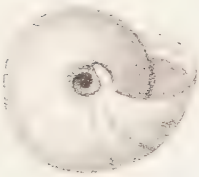
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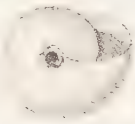
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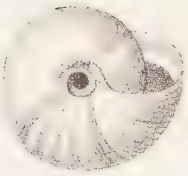
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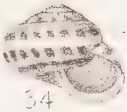
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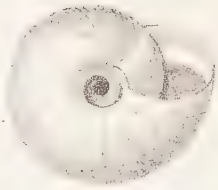
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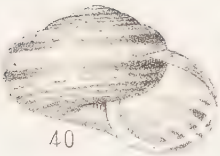
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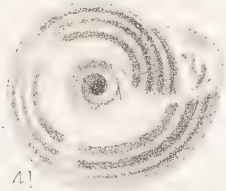
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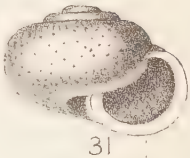
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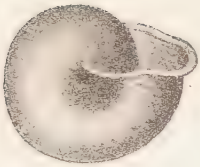
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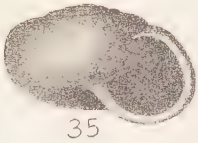
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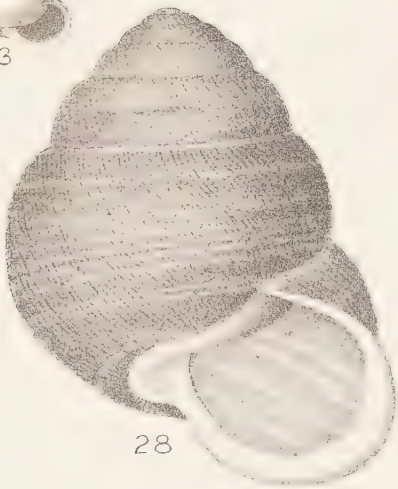
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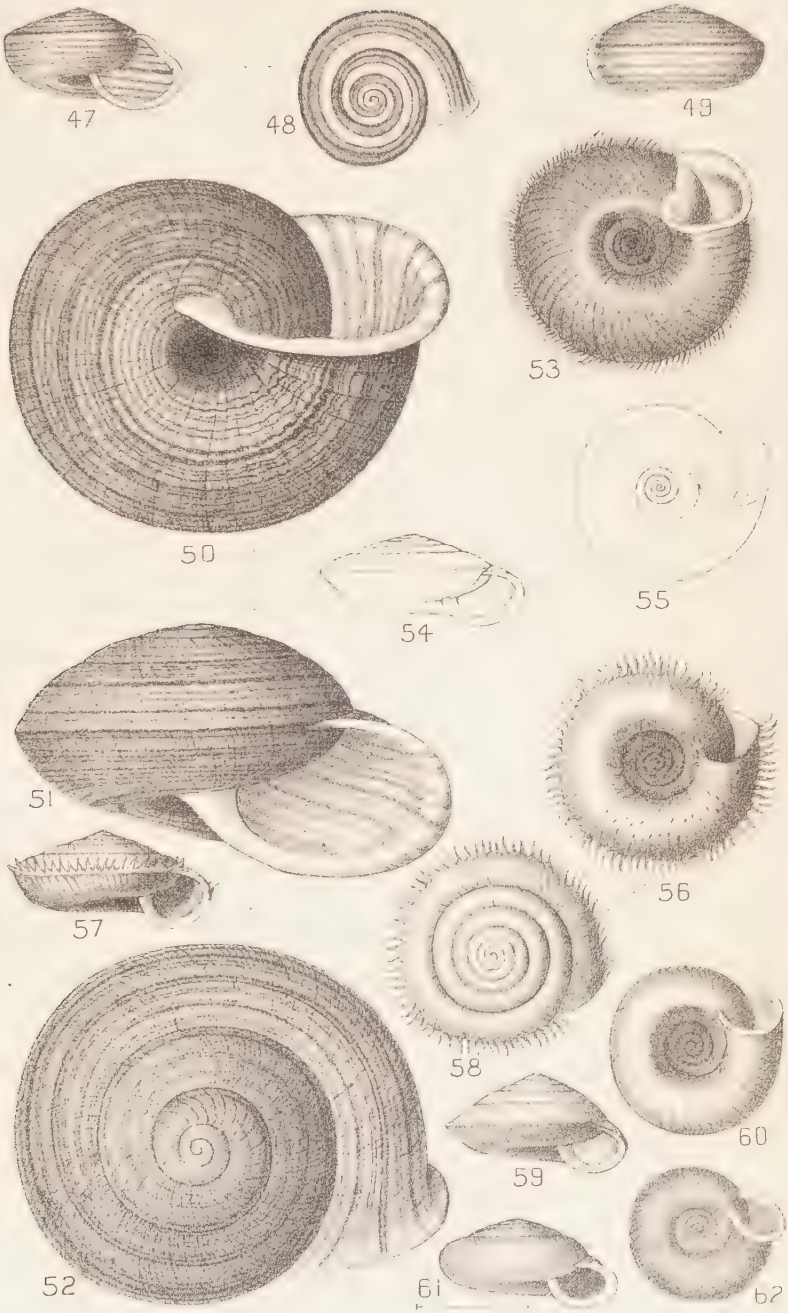
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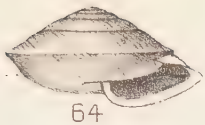
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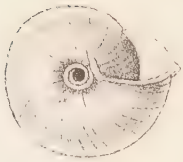
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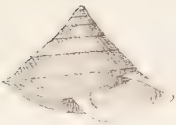
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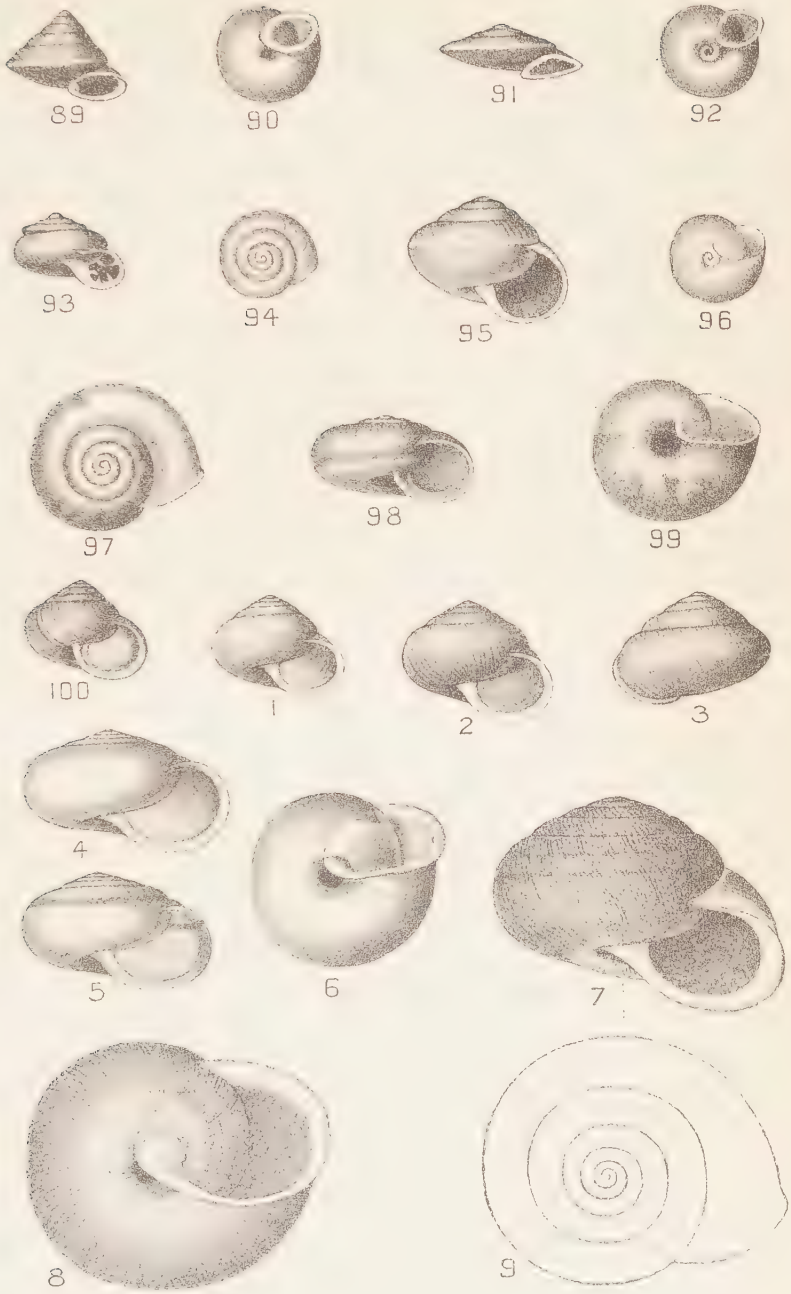
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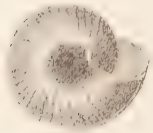
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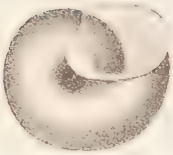
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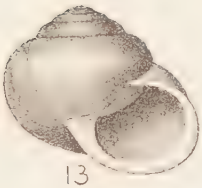
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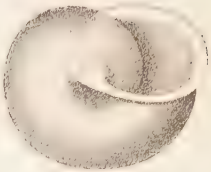
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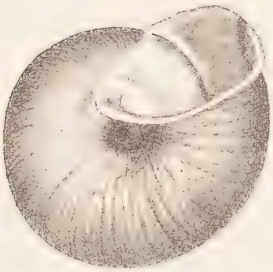
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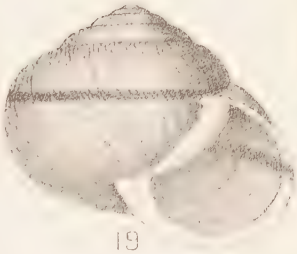
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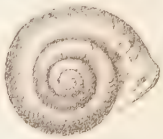
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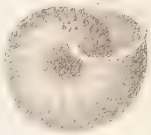
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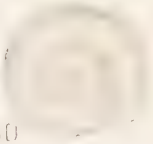
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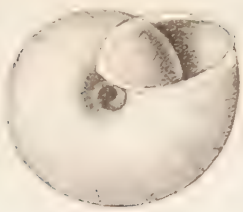
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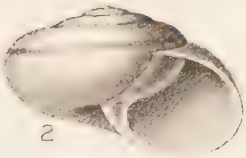
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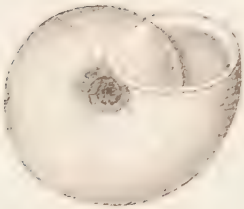
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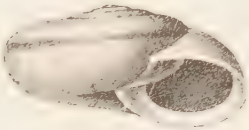
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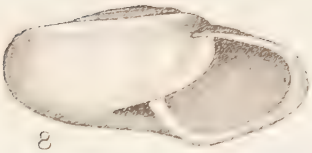
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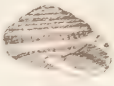
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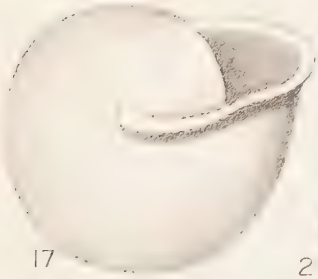
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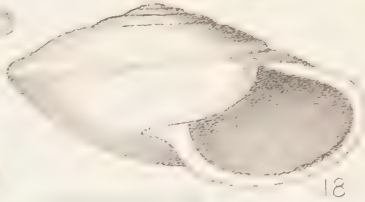
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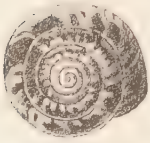
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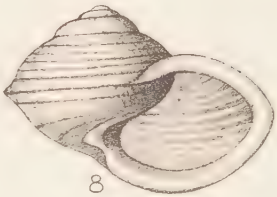
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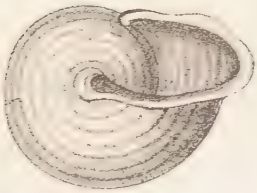
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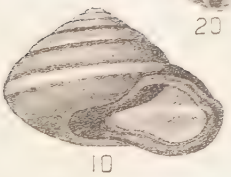
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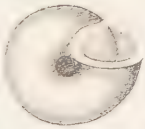
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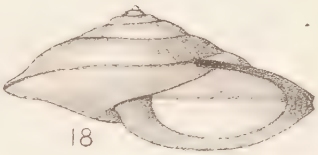
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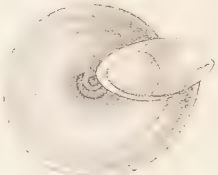
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